

2006 Annual Report

Bureau of Communicable Disease Control and Prevention



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Missouri Department of Health and Senior Services





Acknowledgements

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Communicable Disease Surveillance 2006 Annual Report

Note: This report does not include a summary of sexually transmitted diseases, hepatitis (except hepatitis A), HIV, or environmental conditions.

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Missouri Profile

<u>Population (2005)</u>	<u>5,800,310</u>	<u>Percent of Total Population</u>			
Urban	69.4%	(Based on 2000 census)		<u>Live Births</u>	81,353
Rural	30.6%	(Based on 2000 census)		<u>Deaths</u>	54,475
<u>Sex</u>	<u>Population</u>		<u>Race</u>	<u>Population</u>	<u>Percent of Total Population</u>
Male	2,836,099	48.9%	White	4,993,556	86.1%
Female	2,964,211	51.1%	Black	688,279	11.9%
			Other	118,495	2.0%
<u>Age Group</u>	<u>Population</u>		<u>Region</u>	<u>Population</u>	
<1	78,547	1.3%	Central	636,646	11.0%
1-4	297,270	5.1%	Eastern	2,209,442	38.1%
5-14	753,903	13.0%	Northwest	1,512,337	26.1%
15-24	838,180	14.5%	Southeast	464,844	8.0%
25-39	1,147,173	19.8%	Southwest	977,041	16.8%
40-64	1,912,066	33.0%			
65+	773,171	13.3%			
<u>Leading Causes of Death*:</u>	<u>Number of Deaths Reported</u>	<u>Percent of Total Deaths Reported</u>			
Heart disease	14,647	26.9%			
Cancer	12,484	22.9%			
Cerebrovascular disease (stroke)	3,243	6.0%			
Chronic lower respiratory disease	3,008	5.5%			
Unintentional injuries	2,975	5.5%			
Alzheimer's disease	1,632	3.0%			
Diabetes	1,491	2.7%			
Pneumonia and Influenza	1,321	2.4%			

*Not all causes of death are listed.

Data Provided by: Public Health Practice & Administrative Support Section, Bureau of Health Informatics, Department of Health and Senior Services.

Missouri is 69,697 square miles with slightly more than half of the population living in the two major cities, St. Louis and Kansas City, and their surrounding counties. Jefferson City is the capital. The state has 114 counties. The major flows of traffic within the state are from the east to west along the Missouri valley and southward along the Mississippi.

Although agriculture has remained important as an income-producing activity, services, manufacturing, and wholesale and retail trade have forged ahead since World War II. Manufacturing is led by the production of aerospace and transportation equipment, followed by the processing of food and the production of chemicals. Missouri also hosts the headquarters of the world's largest brewing company. Recreation and tourism have surpassed agriculture in economic importance, with more than seven million tourists a year visiting Branson's celebrity theaters and attractions.

"Missouri." *Encyclopedia Britannica* 2006. Encyclopedia Britannica Premium Service, 8 June 2006.

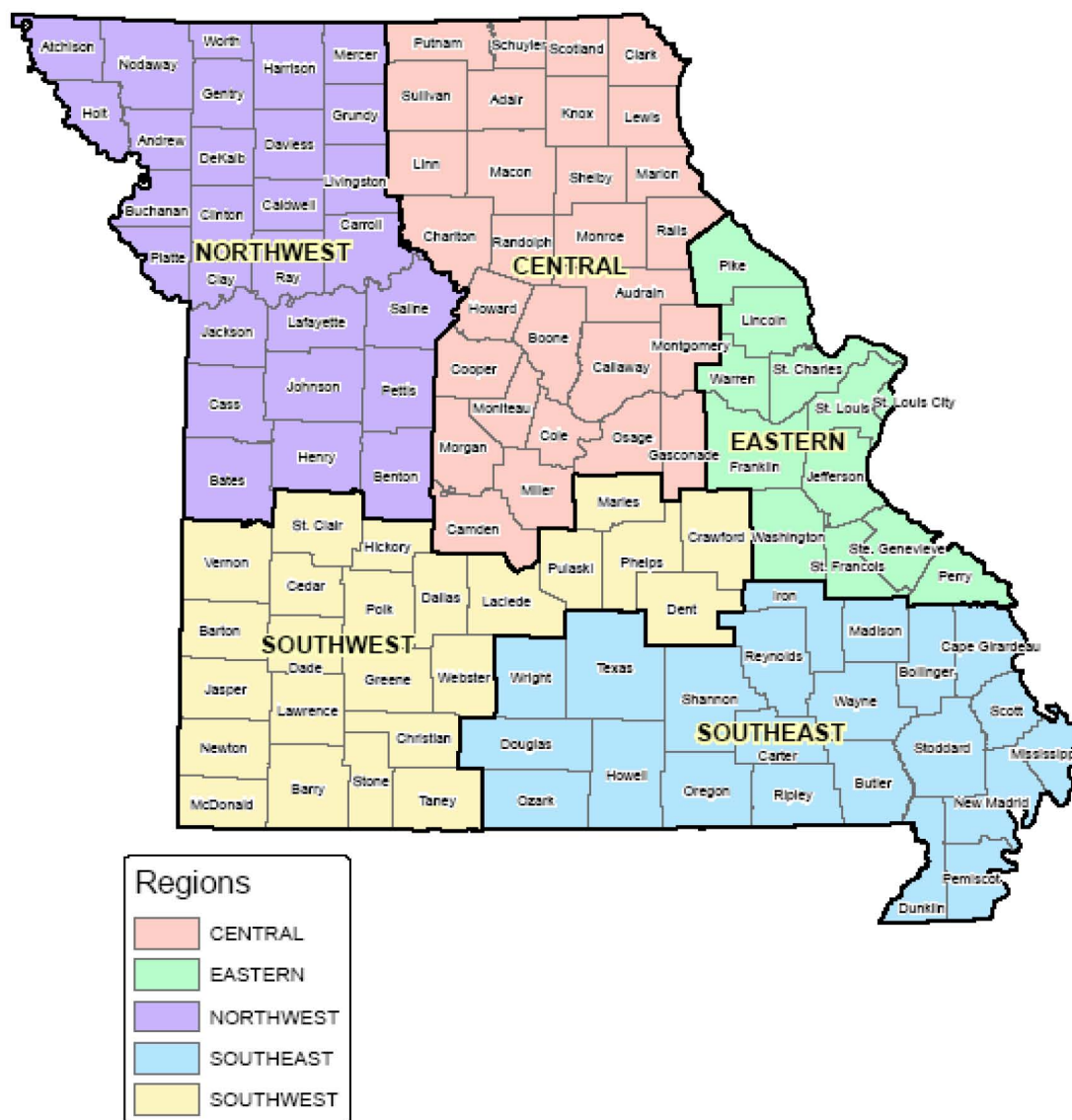
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Missouri Disease Investigation / Emergency Response Regions



Source:
Missouri Department of Health and Senior Services

ITSD
TMS
HealthRegions.mxd
9-6-2008



Introduction

The mission of the Bureau of Communicable Disease Control and Prevention (BCDCP) is to protect Missouri's citizens and visitors from the threats of infectious disease through the surveillance, investigation, prevention, and control of more than 80 communicable diseases and conditions of public health importance. The BCDCP, working with the local public health agencies (LPHAs), evaluates and responds to these reportable conditions as well as newly identified (SARS or monkeypox) and re-emerging infectious disease threats (pandemic influenza).

The services and activities provided by BCDCP include:

- monitoring communicable disease through data collection, analysis, and dissemination;
- coordinating and/or investigating communicable diseases and emerging disease cases (e.g., TB, pandemic influenza, monkeypox, SARS) to implement controls to prevent additional cases;
- assuring rapid response to public health emergencies, disease outbreaks, and natural disasters including bioterrorism events;
- providing consultation, assistance, and recommendations to local public health agencies, physicians, laboratories and others regarding changes to communicable disease reporting requirements and control measures for communicable diseases of public health importance;
- providing education and training on communicable diseases for public health professionals;
- providing information on infectious diseases to local public health jurisdictions, the medical community, and to the general public through press releases, interviews with the news media, pamphlets, reports, the Health Alert Network, the Department of Health and Senior Services (DHSS) web site and the CDCP ListServe.

The above services and activities are included in the Department of Health and Senior Services (DHSS) rule for the **Reporting of Communicable, Environmental and Occupational Diseases**, [19 CSR 20-20.020](#). The BCDCP covers all diseases and conditions that are not addressed by the [Bureau of HIV, STD and Hepatitis](#), or the Bureau of Environmental Epidemiology. Information and statistics for HIV, STD, and Hepatitis can be found by clicking on the bureau name. Data used in this report were gathered from disease and condition reports made by medical providers, laboratories, hospitals, local public health agencies, and others.

The information collected through 19 CSR 20-20.020 flows from the local public health jurisdictions to DHSS and on to the national Centers for Disease Control and Prevention (CDC). Data are linked to the national level through the CDC's National Electronic Telecommunications Surveillance System (NETSS). This information is critical for two reasons:

1. It enables public health agencies to act quickly to prevent the spread of disease and,
2. It provides an overall picture of disease trends at the local, state and national levels. Analyzing these trends allows us to target resources where they are most needed and to assess our effectiveness in preventing and controlling disease.



Introduction

There are limitations to the data provided in this report for the following reasons:

- sick people do not always seek healthcare, and
- healthcare providers and others do not always recognize, confirm, or report notifiable conditions.

Therefore, reported cases may represent only a fraction of the actual burden of disease.

We are pleased to provide the following summary of the data reported in calendar year 2006. In addition to the contributors listed on the previous page, we would like to recognize the staff of our State Public Health Laboratories and the thousands of people in local health departments, clinics, hospitals and clinical laboratories throughout Missouri whose disease reports and efforts constitute the basis for this document. Without vigilant reporting of disease, targeted and effective prevention and control measures cannot be implemented.

While this report was compiled by the Missouri Department of Health and Senior Services, you should keep in mind that most of the public health workforce is in city or county health departments. Therefore, much of the work is at that level. The state, county, and city health departments and their private sector partners work to promote health, protect against illness and injury, and render public health services to all people in Missouri.

A table of all reported notifiable diseases is located [here](#). Where spatial analysis and use of Geographic Information Systems (GIS) was useful, maps have been provided to depict the data. Hyperlinks to additional information are included throughout the document.

We hope that you find this report informative and useful.

Harvey L. Marx, Jr.
Chief, Bureau of Communicable Disease Control and Prevention

“Without health there is no happiness. An attention to health, then, should take the place of every other object. — Thomas Jefferson, 1787

We invite your questions and comments on this report, “Communicable Disease Surveillance 2006 Annual Report”.

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Executive Summary

Every year, infectious diseases impact many Missourians, not only those who are actually ill, but those who provide care for them (friends, relatives and the health care system). In this regard, 2006 proved to be as challenging for public health officials as other previous years. Local public health agencies (LPHA's), laboratories, health care providers, and others reported more than 35,000¹ cases of reportable, communicable conditions to the Department of Health and Senior Services (DHSS), in 2006. As has been the case in previous years, factors such as changes in the reporting rule, outbreaks, increased awareness of specific diseases among health care providers, and emerging infections all had an impact on communicable disease incidence.

Staff at the Missouri State Public Health Laboratory (SPHL) continued to provide expert consultation and a wide range of diagnostic and analytical services. These services include the identification of certain infectious diseases, genetic disorders and environmental health concerns, both in support of public health programs, and as a reference laboratory performing unusual or specialized procedures. Approximately 3,022,228 analyses were performed (many required by law) in 2006 by the main laboratory in Jefferson City and the two branch laboratories in Poplar Bluff and Mount Vernon, as well as contractual agreements. Among other efforts of the past year, the SPHL participated in a survey of private laboratories, identified causative agents for numerous communicable disease investigations and ruled out or confirmed rabies in 2,724 domestic and wild animals.

Every year, the investigation and control of disease outbreaks significantly impacts state and local resources, whether the cases reside inside or outside of Missouri. In 2006, three large, multi-state disease outbreaks associated with nationally distributed food products (one *E. coli* O157:H7 outbreak associated with spinach, and two salmonellosis outbreaks associated with tomatoes and peanut butter, respectively) required extensive investigation for the majority of the United States. Missouri identified several confirmed cases from the *Salmonella* Tennessee outbreak associated with two particular brands of peanut butter. Although Missouri identified no cases from either of the other two national outbreaks, the investigation and laboratory testing consumed a lot of time and resources.

Although state-wide incidence of tuberculosis has decreased over the past five years, new cases continue to demand a great deal of time and attention from the tuberculosis control program staff both at DHSS and at the LPHA's. Four separate and distinct tuberculosis outbreaks were reported in 2006, each requiring extensive contact investigations and leading to the discovery of additional TB disease and latent infections in residents and visitors to Missouri who required long-term antibiotic therapy. These reports, coupled with the threat of multi-drug resistant and extensively drug resistant strains ([MDR-TB](#) and [XDR-TB](#), respectively), are sobering reminders that tuberculosis is not a disease of the past, and that continued surveillance for new cases is essential to controlling the spread of this disease.

¹ The figure "more than 35,000" refers to all reportable communicable diseases that are monitored by the Bureau of Communicable Disease Control and Prevention. Information about other reportable conditions, such as sexually transmitted diseases, HIV/AIDS, and conditions that are not infectious are included in separate DHSS reports.



Executive Summary

Missouri public health officials had some new experiences with vaccine-preventable disease in 2006. Mumps, previously thought of as a childhood disease by many, resurfaced as a major contributor to national disease morbidity in 2006. Missouri was involved in this outbreak that largely affected most Midwestern states, with 170 mumps cases reported in Missouri this past year, more than 40 times that of the five-year median. An adopted child infected with rubeola (measles) traveled on an airplane to Missouri from her home country of China, transmitted the disease to three other individuals on the same flight, and sparked a complicated, multi-state investigation to trace other potentially infected passengers (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5607a3.htm>).

Varicella (chickenpox) also kept disease investigators busy as reported cases increased since its first year as a reportable condition in 2005. Influenza also contributed significantly to Missouri's overall 2006 communicable disease incidence with a reported 14, 845 laboratory-confirmed cases, an increase of 37% above the five-year median.

Shigellosis was once again the cause of a large outbreak in 2006, but in contrast to 2005 (when the Kansas City metro area was most affected), this time it affected the more rural Southeast Region of the state. Child care centers were again strongly associated with disease risk. Lessons learned from the Kansas City experience were promptly implemented. In addition, the fact that the predominant *Shigella* strain exhibited minimal antibiotic resistance, and extensive cooperation between the LPHAs and child care providers in the southeast region helped tremendously in controlling this outbreak.

The Eastern Region conducted an investigation of pediatric skin rashes (folliculitis, apparently caused by *Enterobacter cloacae*) associated with mud exposure during a recreational event. Also, near the end of 2006, the St. Louis metro area saw the beginnings of what could turn into a large *Shigella* outbreak.

In 2006, counties adjacent to Kansas City traded one diarrheal illness outbreak for another, with 186 cases of cryptosporidiosis reported in the Northwest part of the state. One hundred and five of these cases were reported in Clay County, many of which were associated with water park exposure. Missouri's incidence of cryptosporidiosis has been well above the national average for the past three years.

As cryptosporidiosis incidence spiked during the spring and summer of 2006, reports of many other conditions associated with outdoor activities (such as vector-borne diseases and animal bites) also increased during the warmer months.

The number of reported ehrlichiosis cases, Rocky Mountain spotted fever (RMSF), and tularemia (all diseases that are transmitted by tick bites) increased in comparison to the previous year. In contrast, reports of Lyme/Lyme-like disease cases (another infection caused by tick bites) have decreased in comparison with the five-year median, which may be partly due to evidence-based clinical assessments and appropriate laboratory diagnostics.



Executive Sumamry

More than 4,900 animal bites were reported in 2006, with rabies alerts issued for six counties (two involving reports of rabid horses in different parts of the state). Additionally, the list of reportable diseases and conditions increased with the administration of rabies postexposure prophylaxis (PEP) added.

Since 9/11, public health officials have devoted a significant amount of resources preparing for (and sometimes responding to) potential public health emergencies. Reports of infectious disease cases that could potentially be used as weapons, such as tularemia, Q fever and brucellosis, were investigated promptly and vigorously and determined to be naturally-occurring cases. Pandemic influenza planning was, and continues to be, one of the top priorities for the Office of Emergency Coordination, which included extensive efforts to educate representatives of schools, businesses, health care facilities as well as the general public on how to best prepare for such an event. Additionally, ESSENCE, the state-wide, electronic syndromic surveillance system, was enhanced with the addition of 10 hospitals as reporters, and continued efforts to increase the number of users of the system.

This report has more detailed information available on several diseases, including data tables and narrative descriptions of the public health importance of each condition or event. We hope that you find this information informative and useful, both professionally and personally. We would like to thank all local public health agencies and other reporters who worked hard to collect the information presented in this report.

Diseases/Conditions of Interest

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Cryptosporidiosis	page 15	Rabies, Animal and PEP	page 30
Ehrlichiosis	page 18	Shigellosis	page 33
Influenza	page 21	Tuberculosis	page 36
Lyme	page 23	Varicella (Chickenpox)	page 39
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Disease Outbreaks

The BCDCP maintains a database and provides on-site and technical assistance to the local public health agencies on reported outbreaks. We review outbreaks for lessons learned and any new information on disease reservoirs, modes of transmission, control strategies and provide data to CDC for national analysis.



Executive Summary

Diseases and Conditions	Number of Outbreaks	Diseases and Conditions	Number of Outbreaks
Gastrointestinal		Vaccine Preventable	
Acute Gastrointestinal Illness - etiology unknown	24	Chickenpox	27
Clostridium difficile	1	Mumps	2
Cryptosporidiosis	2	Pertussis	1
Norovirus	15	Total	30
Rotavirus	3		
Salmonellosis	2	Other	
Shigellosis	3	Acinetobacter	1
Total	50	Enterobacter cloacae	1
		Erythema Infectiosum (Fifth Disease)	2
		Hand-foot-and-mouth disease	1
Respiratory		Impetigo	1
Acute Respiratory Illness	1	Methicillin-resistant Staphylococcus aureus	5
Influenza and Influenza-like Illness	9	Parapox	1
Tuberculosis	4	Ringworm	1
Total	14	Scabies	6
		Staphylococcus aureus	1
		Streptococcal Group A	2
		Total	22
Total Outbreaks		116	

Diseases of Note

There are several notable decreasing and increasing disease trends as reflected in the [15 year report](#).

Decreasing Trends:

- Lyme Disease, with 6 cases reported in 2006, is at the lowest since 1998, when 12 cases were reported. It is a decrease of 96% from 150 cases reported in 1992, the highest count for the past 15 years. Epidemiologists' and clinicians' increased reliance on evidence-based clinical assessments and appropriate laboratory diagnostics has contributed to this gradual decline in Lyme/Lyme-like disease case numbers in Missouri. For additional information on Lyme disease, click [here](#).
- Tuberculosis (TB) Disease decreased approximately 58% from 245 cases in 1992 to 104 cases reported for 2006. Timely intervention and directly observed therapy as a standard of care have played a significant role in reducing disease burden. For additional information on TB, click [here](#).

Increasing Trends and Significant Increases:

- Cryptosporidiosis, with 283 cases reported in 2006 has increased more than 813% since becoming reportable in 1995. This emerging disease has been associated with several recreational water outbreaks. For additional information on cryptosporidiosis, click [here](#).
- Mumps, with 170 cases reported in 2006, is at the highest since 1979, when 203 cases were reported. This is a significant increase over our five-year median of four cases. The increase can be contributed to a multi-state outbreak that began in the spring of 2006. For additional information on mumps, click [here](#).
- Shigellosis, with 658 cases reported in 2006, has increased more than 100% from the five-year median. Over the past couple of years this has been largely attributed to several community outbreaks. For additional information on shigellosis, click [here](#).



Section A - Communicable Disease Surveillance

Comparative Statistics, Reported Diseases, Missouri 2006

Reportable Diseases & Conditions entered into the Missouri Health Surveillance Information System (MOHSIS)	Case Count 2006	5-Year First Quartile	5-Year Median	5-Year Third Quartile	% Change from 5-Year Median	Rate per 100,000
Animal Bites**	4,952		4,472		10.70%	85.4
Blastomycosis	3	1	2	5	50.00%	0.1
Brucellosis	1	1	1	1	0.00%	0
Campylobacteriosis	686	628	655	714	4.70%	11.8
Chlamydia	22,982	16,181	18,750	21,319	22.60%	396.2
Coccidioidomycosis	3	1	1	1	200.00%	0.1
Creutzfeldt-Jakob Disease (CJD)	6	0	2	2	200.00%	0.1
Cryptosporidiosis	283	52	55	78	414.50%	4.9
Dengue Fever	3	0	0	1	N/A	0.1
E Coli Shiga Toxin Positive	77	0	21	23	266.70%	1.3
E. Coli O157 H7	90	70	75	84	20.00%	1.6
Ehrlichiosis (All)	99	40	54	69	83.30%	1.7
Encephalitis Primary	2	0	0	2	N/A	0
Giardiasis	548	514	522	578	5.00%	9.4
Gonorrhea	10,204	8,792	8,952	9,218	14.00%	175.9
HIV Disease	520	425	467	479	11.30%	9
Haemophilus Influenzae, Invasive	39	20	37	42	5.40%	0.7
Hansen's Disease (Leprosy)	1	0	0	1	N/A	0
Hemolytic Uremic Syndrome	8	2	4	8	100.00%	0.1
Hepatitis A Acute	45	34	60	83	-25.00%	0.8
Hepatitis B Acute	62	130	159	186	-61.00%	1.1
Hepatitis B Chronic Infection	175	13	95	341	84.20%	3
Hepatitis C Acute	38	18	256	612	-85.20%	0.7
Hepatitis C, Chronic	4,831	772	2,774	3,146	74.20%	83.3
Hepatitis D Acute	1	0	0	3	N/A	0
Hepatitis E Acute	1	0	0	0	N/A	0
Influenza***	14,760	4,637	10,860	12,991	35.90%	254.5
Legionellosis	22	22	31	34	-29.00%	0.4
Listeriosis	12	6	8	10	50.00%	0.2
Lyme	6	26	37	41	-83.80%	0.1
Malaria	6	15	16	18	-62.50%	0.1
Measles	2	0	2	2	0.00%	0
Meningococcal Disease	15	28	47	52	-68.10%	0.3
Mumps	170	4	4	4	4150%	2.9
Pertussis	308	147	208	595	48.10%	5.3
Q Fever	11	1	3	3	266.70%	0.2
Rabies Animal	66	43	50	59	32.00%	N/A
Rabies Post Exposure Prophylaxis**	13				N/A	0.2
Rocky Mountain Spotted Fever	163	62	96	106	69.80%	2.8
Rubella	2	0	0	1	N/A	0
Salmonellosis	766	648	801	811	-4.40%	13.2
Shiga Toxin + (Non E. Coli/Unknown Organism)**	13		5		160.00%	0.2
Shigellosis	658	214	321	355	105.00%	11.3
St Louis Encephalitis	1	0	0	1	N/A	0
Staph Aureus VISA**	1				N/A	0
Strep Disease, Group A Invasive	91	62	74	75	23.00%	1.6
Strep Pneumoniae, <5 Years, Invasive	16	3	11	13	45.50%	0.3
Strep Pneumoniae, Drug-Resistant	44	11	16	20	175.00%	0.8
Syphilis, Primary and Secondary	168	34	61	94	175.40%	2.9
Tetanus	1	0	0	0	N/A	0
Toxic Shock (Staph) Syndrome	5	3	4	4	25.00%	0.1
Toxic Shock (Strep) Syndrome	1	2	3	3	-66.70%	0
Tuberculosis	104	127	131	135	-20.60%	1.8
Tularemia	14	27	27	28	-48.10%	0.2
Typhoid Fever	2	1	2	2	0.00%	0
Varicella (Chickenpox)**	1,431				N/A	24.7
West Nile Virus Disease	63	30	36	70	75.00%	1.1
Yersiniosis	9	11	15	20	-40.00%	0.2

**Not a reportable disease in at least 3 of the last 5-years. The count mean of the years reported is used in this situation if available.

***Influenza is reported based on the Influenza Season Year. 2006 includes Weeks 40 to 52 of 2006 and Weeks 1 to 20 of 2007.

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Section A - Communicable Disease Surveillance

Campylobacteriosis

[Click to
view maps](#)

Campylobacteriosis is an infectious disease primarily caused by the bacteria *Campylobacter jejuni* and, less commonly, *Campylobacter coli*. These bacteria are often present in the gastrointestinal tract of both domestic and wild animals including chickens, cows, dogs, cats, rodents, and many others. Campylobacteriosis is usually associated with the handling or consumption of raw or undercooked meats, contaminated food or water, or contaminated raw milk. Persons may also become infected following contact with infected animals including pets (puppies and kittens) and farm animals. The spread of *Campylobacter* from one person to another is uncommon, though may occur particularly if the infected person is a small child. The ingestion of a very small number of the bacteria can result in persons becoming ill.

Table 1. Campylobacteriosis—Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	303	44.2%	10.2	325	-6.8%
	Male	381	55.5%	13.4	354	7.6%
	Unknown	2	0.3%	N/A	1	100.0%
Race	Black	22	3.2%	3.2	13	69.2%
	Other	3	0.4%	2.5	3	0.0%
	Unknown	263	38.3%	N/A	274	-4.0%
	White	398	58.0%	8	339	17.4%
Age Group	00 to <01	31	4.5%	39.5	31	0.0%
	01 to 04	70	10.2%	23.5	79	-11.4%
	05 to 14	78	11.4%	10.3	63	23.8%
	15 to 24	78	11.4%	9.3	77	1.3%
	25 to 39	131	19.1%	11.4	131	0.0%
	40 to 64	225	32.8%	11.8	209	7.7%
	65 plus	71	10.3%	9.2	64	10.9%
	Unknown	2	0.3%	N/A	8	-75.0%
Region	Central	68	9.9%	10.7	68	0.0%
	Eastern	264	38.5%	11.9	259	1.9%
	Northwest	139	20.3%	9.2	128	8.6%
	Southeast	82	12.0%	17.6	79	3.8%
	Southwest	133	19.4%	13.6	143	-7.0%
State of Missouri		686	100.0%	11.8	655	4.7%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.

Campylobacteriosis is an acute diarrheal disease of variable severity. Many infected persons and animals do not exhibit symptoms. Symptomatic cases are characterized by diarrhea (frequently bloody), abdominal pain, malaise, fever, and nausea and/or vomiting. In neonates, bloody diarrhea may be the only symptom. Symptoms usually begin 2-5 days after infection. Mild infections last 1-2 days, and most cases resolve in approximately one week. However, some adults may experience prolonged illness and/or relapses. In very rare instances, post-infection complications include reactive arthritis, febrile convulsions, or Guillain-Barre syndrome (an acute febrile polyneuritis). Campylobacteriosis may mimic acute appendicitis or inflammatory bowel disease.



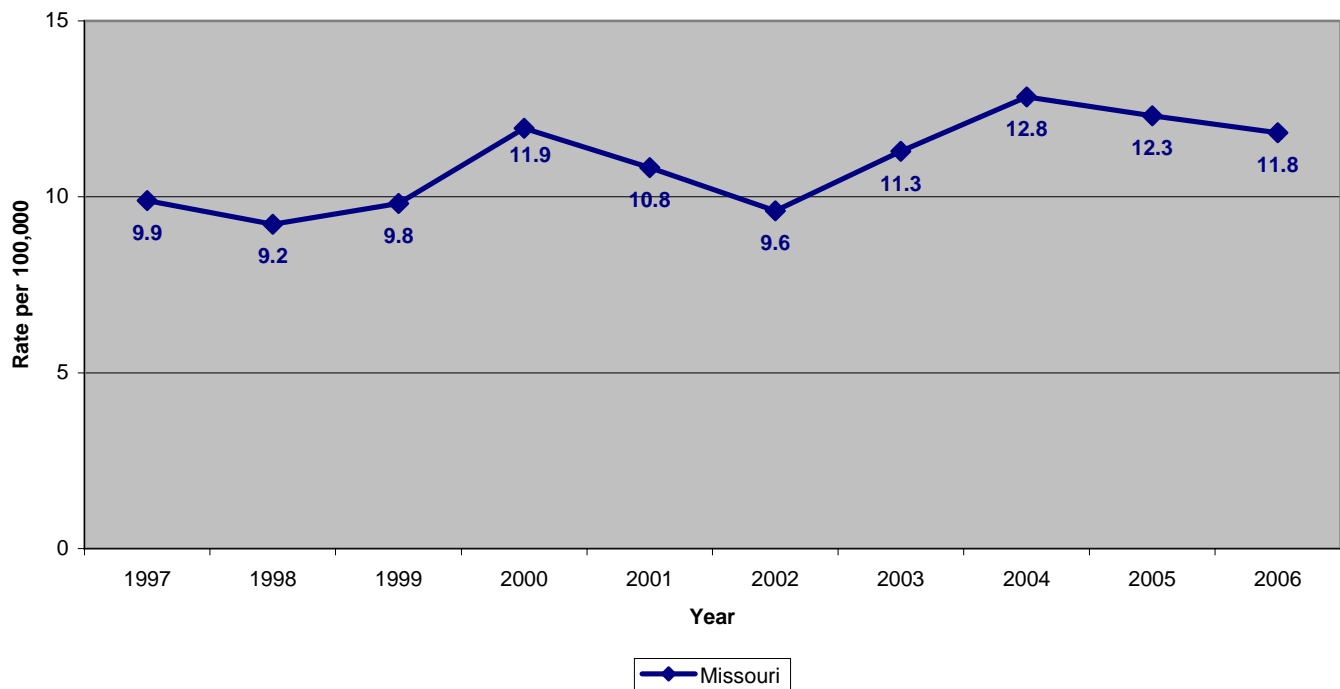
Section A - Communicable Disease Surveillance

Campylobacteriosis - Continued

Statewide in 2006, there were 686 reported cases of confirmed or probable campylobacteriosis for a rate of 11.8 per 100,000 population. The Northwest Region increased by 8.6% over the 5-year median, however, the Southwest Region decreased by 7.0% over the 5-year median. There were no reported outbreaks of campylobacteriosis. The number of reported cases of campylobacteriosis has decreased steadily since 2004.

Comparison to National Data: Campylobacteriosis is not a nationally notifiable disease, however national sentinel surveillance data suggests Missouri has fewer cases reported than is to be expected. A survey of laboratories providing services in Missouri was conducted in an attempt to explain this phenomenon. The laboratory survey did not identify a laboratory barrier to testing of *Campylobacter* in Missouri. The low incidence of *Campylobacter* in Missouri may be attributed to Missouri's excellent food safety programs and regulations, at state and local levels, as well as national programs. An exact reason for Missouri's low incidence of *Campylobacter* remains unknown.

Rate of Reported Cases of Confirmed and Probable Campylobacteriosis, by Year



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Section A - Communicable Disease Surveillance

Cryptosporidiosis

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Cryptosporidiosis or “Crypto” is a diarrheal disease caused by microscopic parasites of the genus *Cryptosporidium*.

Cryptosporidium is found in soil, food, water, or surfaces that have been contaminated with infected human or animal feces. If a person swallows the parasite they can become infected. One cannot become infected through contact with blood. The most common symptoms of Crypto include watery diarrhea and cramps, which can be severe. Weight loss, nausea, vomiting, and fever are also possible. Some people with Crypto may have no symptoms at all. The disease, though typically mild, can result in a life threatening illness in persons with weakened immune systems. Persons at greatest risk of severe disease include those with AIDS; cancer and transplant patients who are taking immunosuppressive drugs; those with other disease that affect the immune system.

Table 1. Cryptosporidiosis—Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	148	52.3%	5	23	543.5%
	Male	135	47.7%	4.8	35	285.7%
Race	Black	8	2.8%	1.2	2	300.0%
	Other	1	0.4%	0.8	0	N/A
	Unknown	57	20.1%	N/A	29	96.6%
	White	217	76.7%	4.3	34	538.2%
Age Group	00 to <01	9	3.2%	11.5	2	350.0%
	01 to 04	62	21.9%	20.9	11	463.6%
	05 to 14	73	25.8%	9.7	18	305.6%
	15 to 24	21	7.4%	2.5	8	162.5%
	25 to 39	74	26.1%	6.5	11	572.7%
	40 to 64	34	12.0%	1.8	11	209.1%
	65 plus	9	3.2%	1.2	6	50.0%
	Unknown	1	0.4%	N/A	0	N/A
Region	Central	7	2.5%	1.1	3	133.3%
	Eastern	41	14.5%	1.9	12	241.7%
	Northwest	186	65.7%	12.3	16	1063.0%
	Southeast	8	2.8%	1.7	3	166.7%
	Southwest	41	14.5%	4.2	28	46.4%
State of Missouri		283	100.0%	4.9	55	414.5%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.

During the past two decades, cryptosporidiosis has become recognized as one of the most common causes of waterborne disease in humans within the United States. The parasite may be found in drinking water and recreational water in every region of the United States and throughout the world. Washing hands is the most effective means of preventing cryptosporidiosis transmission.

Statewide, in 2006, there were 283 cases reported, which was a 414% increase in the number of cases compared to the five-year median data from 2001-2005. The incidence rate for the year was 4.9 per 100,000 population. The increased case counts continues an upward trend that began in 2005 when 246 cases occurred.



Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Missouri experienced a significant increase in the number of cases of Crypto in 2006, which can be attributed in large part to an outbreak during the months of June through September, in the Northwest Region of Missouri. The Northwest Region reported 186 cases, an increase of 1063% compared to the five-year median. Individuals 14 years of age or younger accounted for approximately 50% of all reported cases in Missouri for 2006. Recreational water was suspected as a means of transmission. As a result, health alerts were issued in communities that experienced a significant number of cases. Control measures included closing the city's spray parks and pools, and super-chlorinating the pools. Additional testing was conducted at these pools. Educational materials were shared with the community including both private and public pool owners.

Public education targeting these risk groups also included the following:

- Wash hands thoroughly with soap and water.
- Do not swallow recreational water. *Cryptosporidium* can survive for days in swimming pools with adequate chlorine levels.
- Do not drink untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.
- Do not drink untreated water during community-wide outbreaks of disease caused by contaminated drinking water.
- Do not use untreated ice or drinking water when traveling in countries where the water supply might be unsafe.
- Wash and/or peel all raw vegetables and fruits before eating.
- Use safe, uncontaminated water to wash all food that is to be eaten raw.
- Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.

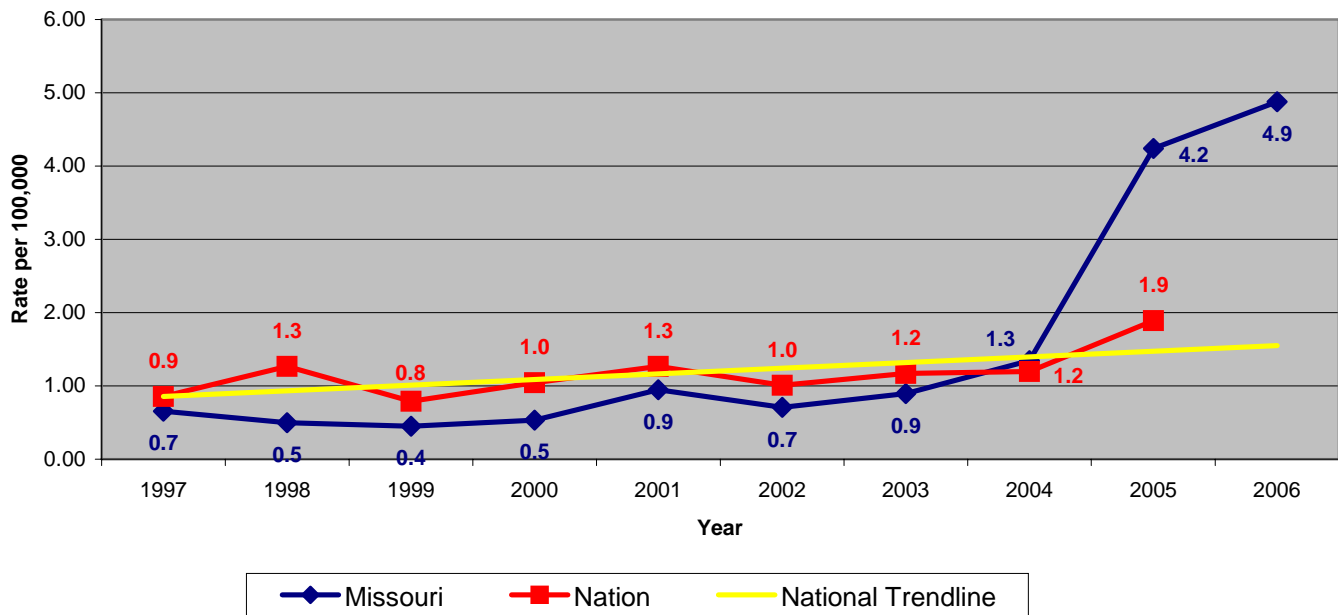
Comparison to National Data: The annual rate of reported cryptosporidiosis in Missouri has shown a steady increase for the past three years beginning in 2004. For each of these years, Missouri has surpassed the national rate. In 2006, the national rate per 100,000 population was 1.72 while the state had a rate of 4.88. While the national rate is experiencing a more gradual upward trend, the increased incidence of the disease in Missouri in 2005 and 2006 can be attributed to large regional outbreaks that occurred in each of those years.



Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Rate of Reported Cases, Confirmed and Probable, Cryptosporidiosis, by Year
Missouri versus United States



Cryptosporidiosis is resistant to lower levels of chlorine often found in public pools during times of high usage, or when pools are not in service (e.g. after hours). This stresses the importance of pool operators being diligent regarding chlorine levels and monitoring for fecal accidents.

Additional Website Resources

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Section A - Communicable Disease Surveillance

Ehrlichiosis/Anaplasmosis

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Ehrlichiosis and anaplasmosis are tick-borne illnesses characterized by acute onset of fever, headache, myalgia, or malaise. Nausea, vomiting, or rash may be present in some cases. Laboratory findings may include thrombocytopenia, leukopenia, or elevated liver enzymes. These illnesses can be severe especially if untreated. Severe manifestations of the disease may include prolonged fever, renal failure, disseminated intravascular coagulopathy, meningoencephalitis, adult respiratory distress syndrome, seizures or coma. It is estimated that 2%-3% of patients may die from the infection.

Ehrlichiosis and anaplasmosis are caused by bacterial zoonotic pathogens that can be passed on to humans through the bite of an infected tick. Ticks can pick up ehrlichiae or anaplasmae during a

blood meal taken from an infected animal host. During a later blood meal, the tick can transmit the bacteria to the human while it is feeding. It usually takes several hours of tick attachment before the host becomes infected. Some patients do not recall a tick bite or exposure to tick habitat.

Statewide in 2006, Missouri reported 99 cases of confirmed and probable ehrlichiosis. This represents a statewide incidence rate of 1.7 per 100,000 population, which is an 83.3% increase over the five-year median incidence rate. Males appear to be at higher risk for infection with ehrlichiosis; 72.7% of Missouri's 2006 cases were male. This may be due to more males having greater occupational and recreational exposure to tick habitats.

Table 1. Ehrlichiosis/Anaplasmosis - Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5-Year Median
Sex	Female	27	27.3%	0.9	20	35.0%
	Male	72	72.7%	2.5	33	118.2%
Race	Black	2	2.0%	0.3	0	N/A
	Unknown	40	40.4%	N/A	20	100.0%
	White	57	57.6%	1.1	34	67.6%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	2	2.0%	0.7	0	N/A
	05 to 14	3	3.0%	0.4	1	200.0%
	15 to 24	5	5.1%	0.6	2	150.0%
	25 to 39	7	7.1%	0.6	6	16.7%
	40 to 64	49	49.5%	2.6	27	81.5%
	65 plus	33	33.3%	4.3	17	94.1%
Region	Central	25	25.3%	3.9	15	66.7%
	Eastern	18	18.2%	0.8	9	100.0%
	Northwest	23	23.2%	1.5	11	109.1%
	Southeast	1	1.0%	0.2	3	-66.7%
	Southwest	32	32.3%	3.3	13	146.2%
State of Missouri		99	100.0%	1.7	54	83.3%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



Section A - Communicable Disease Surveillance

Ehrlichiosis/Anaplasmosis - Continued

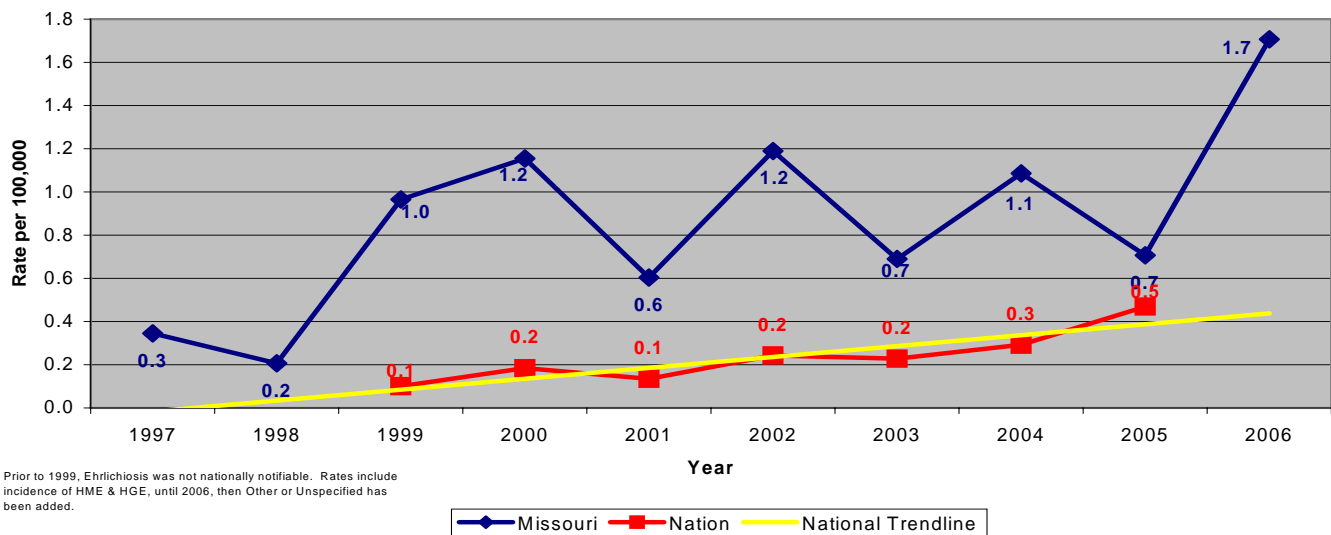
Ehrlichia chaffeensis (HME) occurs primarily in the southeastern and south-central regions of the country and is principally transmitted by the lone star tick. Lone star ticks are very tolerant to heat and humidity and find their prey by both ambush and hunting. White-tailed deer are a major animal host of lone star ticks and key animal reservoir for *E. chaffeensis*.

Ehrlichia ewingii has been limited to a few patients in Missouri, Oklahoma and Tennessee, most of who have had underlying immunosuppression. The natural history of this bacterium is not completely known. Lone star ticks may be the vector responsible for transmission and dogs may be an animal reservoir host for this pathogen.

Anaplasma phagocytophilum (formerly *Ehrlichia phagocytophila* (HGE)) occurs primarily in the northeastern and upper mid-western United States and is transmitted by the blacklegged tick. Deer, elk and wild rodents are likely animal reservoir hosts for this bacterium.

Comparison to National Data: While both national and Missouri rates fluctuate from year to year, Missouri's rates of ehrlichiosis have consistently been higher than the national rates since 1998. The peaks and valleys of the ehrlichiosis rates may be due in part to environmental factors. In years of plentiful wildlife food production, animal host populations may increase in numbers, fostering tick population increases as well. In turn, an abundance of ticks increases the opportunity of human exposure to pathogens that are carried by ticks.

Rate of Reported Cases, Confirmed and Probable, Ehrlichiosis, by Year
Missouri versus United States





Section A - Communicable Disease Surveillance

Ehrlichiosis/Anaplasmosis - Continued

The increased morbidity in ehrlichiosis, especially in males, stresses the need for targeted public health education regarding avoidance of tick habitat or the use of proper protective measures such as repellents.

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Section A - Communicable Disease Surveillance

Influenza

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Influenza is an acute viral disease of the respiratory tract characterized by abrupt onset of fever, often with chills or rigors, headache, malaise, diffuse myalgia, and nonproductive cough. Subsequently, the respiratory tract signs of sore throat, nasal congestion, rhinitis, and cough become more prominent.

The influenza season is defined as the period between week 40 of one year and week 20 of the next. The 2006-2007 season began September 30, 2006 and ended May 26, 2007. Statewide, for the 2006-2007 season, there were 14,845 reported cases of confirmed influenza in Missouri, for a rate of 255.9 per 100,000 population.

Influenza A accounted for 61.8% of the cases, which is in keeping with previous years. Usually there are two distinct age groups, those under the age of 13 and those 50 years or above. Approximately 72% of all reported cases were between <1 and 14 years of age. Those 50 years or above accounted for 6%. The number of outbreaks (13) represents the same number as the previous 2005-06 season.

Influenza affects the health of a large number of people every year. Most people recover within a week, but a cough and tiredness can last two weeks or longer. Some of the complications caused by influenza include bacterial pneumonia, dehydration, and worsening of chronic medical conditions, such as congestive heart failure, asthma, or diabetes. Children may get sinus problems and ear infections as complications from the flu. Those aged 65 years and older, children under age 2, and persons of any age with chronic medical conditions are at highest risk for serious complications of flu. The most common complication is pneumonia. In the United States, influenza and pneumonia combined is among the top 10 leading causes of death. On average, influenza is annually associated with more than 36,000 deaths and more than 200,000 hospitalizations.

Table 1: 2006-2007 Influenza Counts and 5-Season Median, by Influenza Type

Influenza Type	2006-07 Season	% of Total	5-Season Median	% Change from 5-Season Median
Influenza A	9,175	61.8%	6,705	36.8%
Influenza B	2,207	14.9%	881	150.5%
Influenza Unknown Or Untyped	3,463	23.3%	3,052	13.5%
Total	14,845	100%	10,860	36.7%

Date Source: Missouri Health Information Surveillance System (MOHSIS).

Table 2: 2006-2007 Influenza Count by Age Group

Age Group	2006-07 Season	% of Total	5-Season Median	% Change from 5-Season Median
00-<02	1,703	11.5%	1,320	29.0%
02-04	2,503	16.9%	991	152.6%
05-14	6,474	43.6%	2,161	199.6%
15-24	1,323	8.9%	1,134	16.7%
25-49	1,960	13.2%	1,504	30.3%
50-64	528	3.6%	599	(11.9%)
65+	354	2.4%	1,275	(72.2%)
Total	14,845	100%	10,860	36.7%

Date Source: Missouri Health Information Surveillance System (MOHSIS).



Section A - Communicable Disease Surveillance

Influenza - Continued

In Missouri, influenza and pneumonia are associated with approximately 1,500 - 3,000 deaths per year. The economic impact of influenza illness is staggering. Studies have shown that in an average year, direct and indirect medical costs in the United States are in the billions of

dollars. Currently an influenza vaccine is available and is licensed for use in persons six months of age to adult. The vaccine is effective in preventing disease in persons 18-49 years of age and lessening complications in those 50 and older, and/or with chronic conditions.

The Southeast Region had the highest rate per 100,000 population with 384.2 or 1,786 cases.

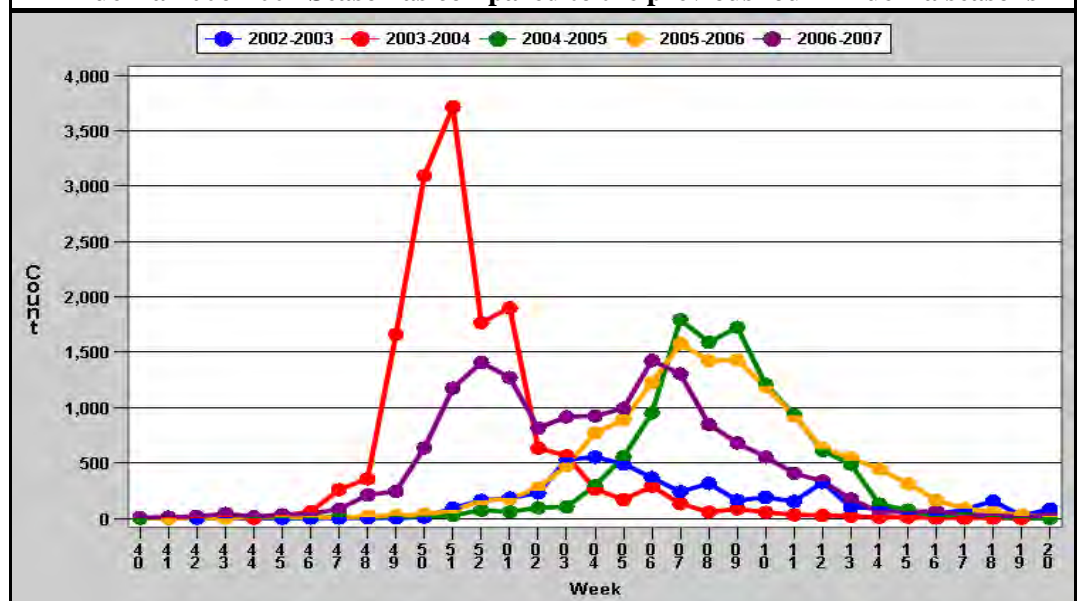
The number of cases for the 2006-2007 influenza season was higher than the previous two years yet was lower than the previous record of 17,834 reported in the 2003-2004 season. Improved availability of rapid tests and increased testing by physicians may contribute to the growing number of cases. Laboratory-confirmed cases of influenza are not reportable nationwide so national data are unavailable for comparison.

Table 3: Influenza Comparative Statistics by Health Regions, Missouri 2006¹

	2006-07 Case Count	% of Total	Rate* 2006-07	5-Season Median	% Change from 5-Season Median
Central	1,875	12.6%	294.5	1,598	17.3%
Eastern	3,643	24.5%	164.9	4,146	-12.1%
Northwest	3,856	26.0%	255.0	2,653	45.3%
Southeast	1,786	12.0%	384.2	680	162.6%
Southwest	3,685	24.8%	377.1	1,587	132.2%
State of Missouri	14,845	100.0%	255.9	10,860	36.7%

¹Socio-demographic Category Information is missing for most Influenza data. N/A=No computation made.
Data Source: Missouri Health Information Surveillance System (MOHSIS).

Influenza 2006-2007 Season as compared to the previous four influenza seasons



Data Source: Missouri Health Information Surveillance System (MOHSIS).

Additional Website Resources

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Section A - Communicable Disease Surveillance

Lyme

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Lyme Disease is the most common tick-borne disease in the United States and Europe. It was first recognized in the mid-1970s in a cluster of children with apparent juvenile arthritis in and around Lyme, Connecticut. In 1981, a previously unidentified tick-borne bacterium called *Borrelia burgdorferi* (*B. burgdorferi*) was found to be the cause of Lyme disease.

Patients treated with antibiotics in early *B. burgdorferi* infection usually recover rapidly and completely. In approximately 80% to 90% of Lyme disease patients, early symptoms include an annular or “bull’s eye” skin rash called “erythema migrans” (EM). Often the rash is accompanied by flu-like symptoms, which may include a general feeling of illness (malaise), fatigue, headache, muscle and joint pain, and fever.

If Lyme disease is not recognized or treated during the early localized phase of infection it may infect other body systems, including joints (Lyme arthritis), the heart, and the nervous system. In addition, *B. burgdorferi* infection that is not treated can lead to chronic arthritis or irreversible neurologic damage. Lyme disease infections rarely result in fatalities.

Table 1. Lyme—Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	2	33.3%	0.1	25	-92.0%
	Male	4	66.7%	0.1	12	-66.7%
Race	Black	0	0.0%	0	0	N/A
	Unknown	4	66.7%	N/A	15	-73.3%
	White	2	33.3%	0	19	-89.5%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	0	0.0%	0	1	-100.0%
	05 to 14	0	0.0%	0	4	-100.0%
	15 to 24	1	16.7%	0.1	2	-50.0%
	25 to 39	1	16.7%	0.1	12	-91.7%
	40 to 64	3	50.0%	0.2	16	-81.3%
	65 plus	1	16.7%	0.1	3	-66.7%
Region	Central	0	0.0%	0	4	-100.0%
	Eastern	1	16.7%	0	6	-83.3%
	Northwest	2	33.3%	0.1	10	-80.0%
	Southeast	2	33.3%	0.4	2	0.0%
	Southwest	1	16.7%	0.1	4	-75.0%
State of Missouri		6	100.0%	0.1	37	-83.8%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



Section A - Communicable Disease Surveillance

Lyme Disease - Continued

There have been Missouri patients with symptoms (including EM rashes) similar to those in other areas of the United States, but the Lyme bacteria has not yet been isolated from any patients in Missouri. As required by state regulation, the Missouri Department of Health and Senior Services reports these cases of the “Lyme-like” disease to CDC as Lyme disease because patients with EM meet the strict CDC case definition for this disease.

Since 1994, Lyme/Lyme-like disease case reports have continued to decline in Missouri, with the exception of 1999 and 2003 when counts reached 72 and 70 respectively ([15 Year Report](#)). Although Lyme disease diagnosis continues to be a controversial issue, Missouri’s state and county public health epidemiologists are more familiar with the current scientific understanding of this disease, particularly with testing protocols that can improve the specificity of Lyme disease laboratory diagnostics and provide a higher confidence that an individual was infected with *B. burgdorferi*. Epidemiologists’ and clinicians’ increased reliance on evidence-based clinical assessments and appropriate laboratory diagnostics has contributed to this gradual decline in Lyme/Lyme-like disease case numbers in Missouri.

Statewide in 2006, Missouri identified six confirmed cases of Lyme/Lyme-like disease, which is a substantial (83%) decrease from the median case count for the previous five-year period. This represents a statewide incidence rate of 0.1 cases per 100,000 for Lyme/Lyme-like disease and a drop from the 2005 statewide rate of 0.3 reports per 100,000.

A shift in case distribution in Missouri occurred in 2006, with case numbers from the Northwest Region dropping 80% from the median case count for that region for the previous five-year period. Only two of Missouri’s six Lyme/Lyme-like disease cases in 2006 occurred in women, which is a marked reduction (92%) from the median case count for women (12) for the previous five-year period. None of Missouri’s 2006 cases occurred in individuals under the age of 15, with half (3) of the cases in the 40 to 64 age group. None of Missouri’s six 2006 case reports resulted in death.

Although the reported incidence of Lyme/Lyme-like disease is dropping in Missouri, its citizens should be alert to lifestyle and/or environmental factors that may increase their exposure to ticks (such as travel to the countryside, involvement in outdoor activities, and urbanization of rural areas).

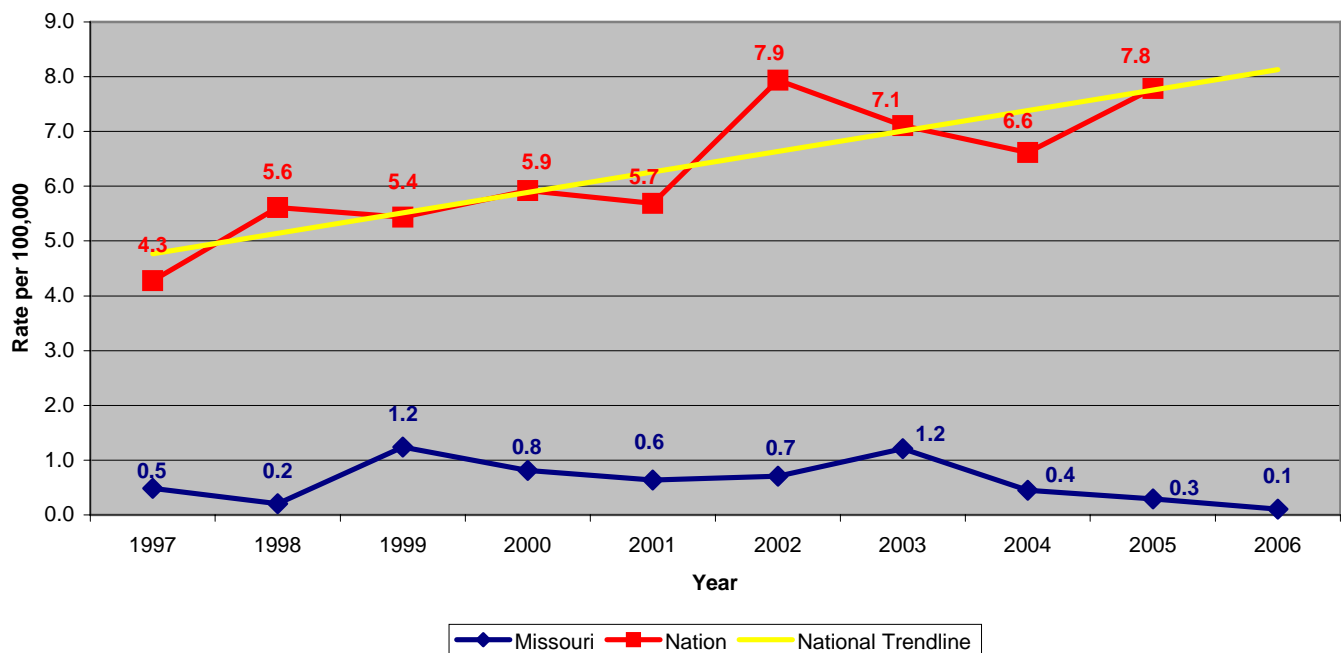


Section A - Communicable Disease Surveillance

Lyme - Continued

Comparison to National Data: Compared to the national case rates for Lyme disease, Missouri has seen fluctuation in its annual incidence rate, the highest rate of 1.24 per 100,000 occurring in 1999 and the lowest being the present rate 0.10. In a marked contrast, nationwide case rates per 100,000 have consistently risen over the last 10 years.

Rate of Reported Cases, Confirmed and Probable, Lyme Disease, by Year
Missouri versus United States



Many Internet web sites incorrectly describe Lyme disease as an incurable disease. Clinical treatment trials have shown that the majority of patients, even those who are diagnosed in a later phase of the disease, respond to antibiotic treatment, although with some people, symptoms may persist for weeks or months. Many medical researchers and practitioners, as well as emerging disease specialists hold serious concerns that the long-term antimicrobial therapies promoted by some Lyme disease advocacy groups will contribute to the problem of antibiotic-resistant community-acquired infections resulting from other bacteria.

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Section A - Communicable Disease Surveillance

Mumps

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Mumps is an illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting greater than or equal to 2 days, and without other apparent cause.

Statewide in 2006, Missouri had 170 reported cases for a rate of 2.9 per 100,000 population. This is a 4150% increase from the five-year median of four cases. For the period January 1 through October 7, five states, Missouri, Iowa, Kansas, Illinois and Nebraska, accounted for 66% of reported cases nationally. Analysis of the cases that occurred nationally indicated that the median age was 22 and that 63% were female. The highest age-specific rate was in persons aged 18-24 years, many of whom were college students. Missouri cases were generally not related to colleges and universities.

Table 1. Mumps—Comparative Statistics, by Socio-demographic Category, Missouri ¹						
		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	111	65.3%	3.7	2	5450.0%
	Male	58	34.1%	2	2	2800.0%
	Unknown	1	0.6%	N/A	0	N/A
Race	Black	7	4.1%	1	0	N/A
	Unknown	17	10.0%	N/A	0	N/A
	White	146	85.9%	2.9	3	4767.0%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	14	8.2%	4.7	1	1300.0%
	05 to 14	45	26.5%	6	2	2150.0%
	15 to 24	36	21.2%	4.3	0	N/A
	25 to 39	35	20.6%	3.1	0	N/A
	40 to 64	38	22.4%	2	1	3700.0%
	65 plus	2	1.2%	0.3	0	N/A
Region	Central	23	13.5%	3.6	1	2200.0%
	Eastern	12	7.1%	0.5	0	N/A
	Northwest	118	69.4%	7.8	1	11700.0%
	Southeast	4	2.4%	0.9	0	N/A
	Southwest	13	7.6%	1.3	2	550.0%
State of Missouri		170	100.0%	2.9	4	4150.0%
¹ Socio-demographics are missing for some cases. *All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics. Data Source: Missouri Health Surveillance Information System.						

A total of 303 cases of mumps were initially reported. However, 133 were determined not to be cases of mumps. Numerous theories have been advanced for this high number of seemingly erroneous reports. The historic success of the MMR vaccine in preventing cases of mumps and the high levels of vaccination in the general population means that health care providers have little experience with mumps. Further, due to the high level of vaccination in the general population, many of the cases of mumps that do occur are in people who have been previously vaccinated. That, coupled with the publicity in the medical and public press regarding the outbreaks in neighboring states resulted in a number of case reports that, upon further investigation, did not appear to actually be mumps. Investigating those cases placed an additional burden on the Local Public Health Agencies, whose staffs responded admirably.



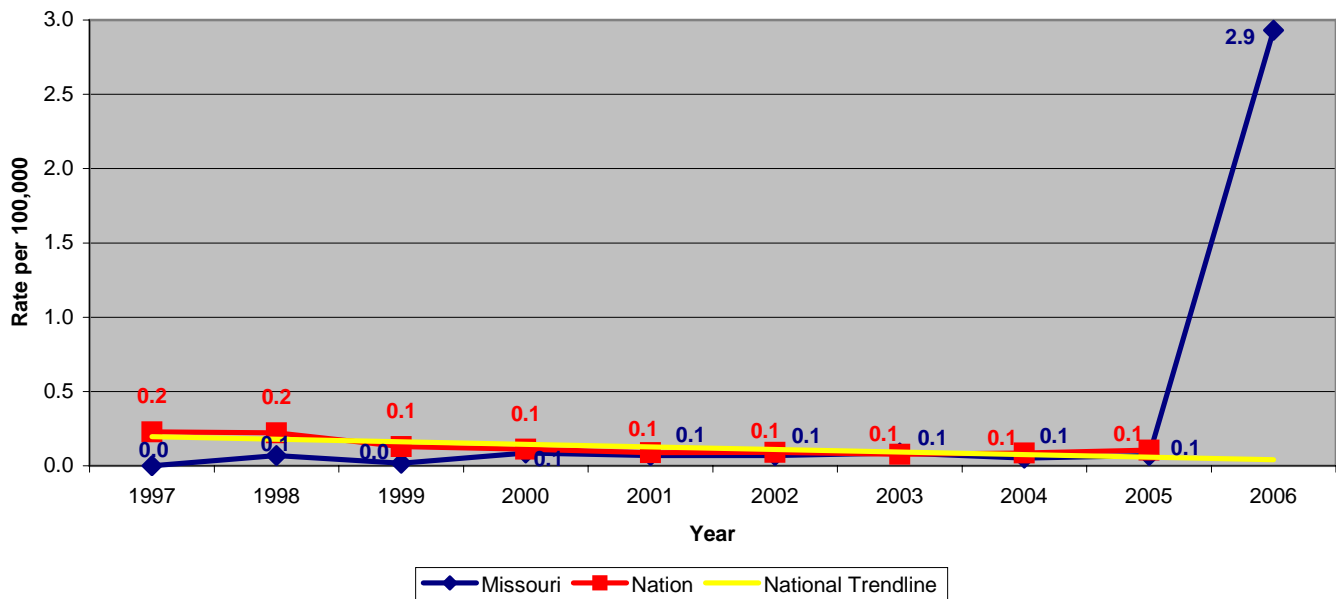
Section A - Communicable Disease Surveillance

Mumps - Continued

Comparison to National Data: During 2006, the United States experienced a major outbreak of mumps. Preliminary data from the CDC shows 6,567 cases of confirmed or probable mumps cases were reported during 2006. This is compared to a median of 266 cases for the five year period 2001 – 2005.

Missouri ranked eighth nationally, 2.9 per 100,000, experiencing over 40 times our historic number of cases. They were disproportionately located in the Northwest Region, which had 69.4% of all reported cases. The increase in Missouri was most likely the result of the larger Midwest regional outbreak.

Rate of Reported Cases, Confirmed and Probable, Mumps, by Year
Missouri versus United States



This multi-state outbreak of mumps demonstrates the need for public awareness of adult immunization recommendations and follow-up with their health care providers to assure they are current with their immunizations.

Additional Website Resources

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Section A - Communicable Disease Surveillance

Q Fever

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Q fever is a zoonotic disease caused by *Coxiella burnetii*, a species of bacteria that is distributed globally. It is a febrile illness usually accompanied by rigors, myalgia, malaise, and retrobulbar headache. Severe disease can also include acute hepatitis, pneumonia, and meningoencephalitis. The bacterium that causes Q fever is a long-lived, highly infectious disease agent, and has been classified as a potential biological agent. Many human infections are unapparent, however, unrecognized or untreated, Q fever may cause long-term heart or liver damage.

Cattle, sheep, and goats are the primary reservoirs of *C. burnetii*. Infection has been noted in a wide variety of other animals, including

other species of livestock and in domesticated pets. *Coxiella burnetii* does not usually cause clinical disease in these animals, although abortion in goats and sheep has been linked to *C. burnetii* infection. Organisms are excreted in milk, urine, and feces of infected animals. Most importantly, during birthing the organisms are shed in high numbers within the amniotic fluids and the placenta. The organisms are resistant to heat, drying, and many common disinfectants. These features enable the bacteria to survive for long periods in the environment. Infection of humans usually occurs by inhalation of these organisms from air that contains airborne barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected herd animals. Airborne particles containing *C. burnetii* may be carried downwind for a kilometer or more. Wool, straw, fertilizer and laundry may be also become contaminated with *C. burnetii* from infected animals. Humans are often very susceptible to the disease, and very few organisms may be required to cause infection.

Statewide in 2006, there were 11 reported cases of Q Fever for a rate of 0.2 per 100,000 population. Cases in Missouri are distributed throughout the state, with the exception of the Southwest Region which reported zero

Table 1. Q Fever—Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5 Year Median
Sex	Female	4	36.4%	0.1	0	N/A
	Male	7	63.6%	0.2	1	600.0%
Race	Black	1	9.1%	0.1	0	N/A
	Unknown	7	63.6%	N/A	1	600.0%
	White	3	27.3%	0.1	1	200.0%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	0	0.0%	0	0	N/A
	05 to 14	1	9.1%	0.1	0	N/A
	15 to 24	1	9.1%	0.1	0	N/A
	25 to 39	2	18.2%	0.2	1	100.0%
	40 to 64	4	36.4%	0.2	1	300.0%
	65 plus	3	27.3%	0.4	1	200.0%
Region	Central	1	9.1%	0.2	0	N/A
	Eastern	5	45.5%	0.2	1	400.0%
	Northwest	2	18.2%	0.1	1	100.0%
	Southeast	3	27.3%	0.6	0	N/A
	Southwest	0	0.0%	0	1	-100.0%
State of Missouri		11	100.0%	0.2	3	266.7%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



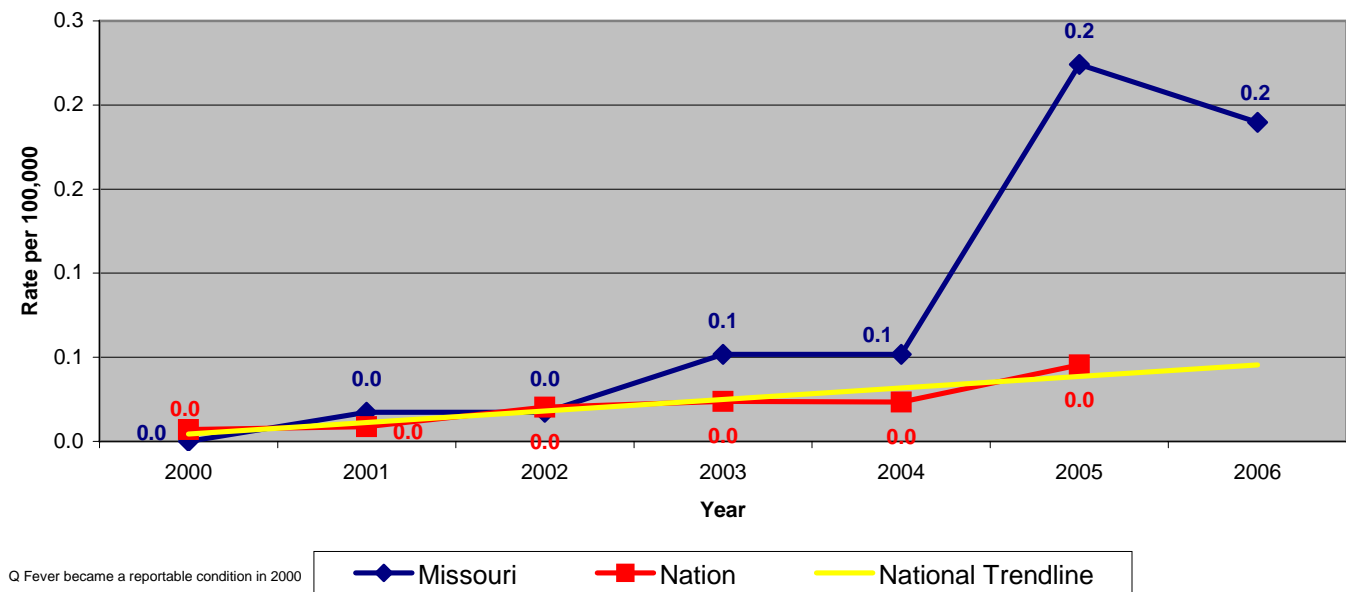
Section A - Communicable Disease Surveillance

Q Fever - Continued

cases. The Eastern Region experienced the largest number of cases with five, for a rate of 0.2 per 100,000 population, but that region is also the most populous. The Southeast Region had three cases, for a rate of 0.6 per 100,000 population.

Comparison to national trend: Since becoming reporting in 2000, Q Fever in Missouri has essentially matched the national trend through 2004 (as of this report, national data was not available for 2006).

Rate of Reported Cases, Confirmed and Probable, Q Fever, by Year
Missouri versus United States



Since Q fever is a potential biological agent, reports of suspected *C. burnetti* infections are promptly investigated in a cooperative effort between DHSS and the local public health agencies. Investigators ruled out bioterrorism for all of the 2006 reports. Missouri's rate per 100,000 has exceeded the national incidence since 2003. Missouri is second in the nation for cattle operations and tenth for sheep operations, as well as increased awareness by public health officials and physicians may account for the increased number of cases.

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Section A - Communicable Disease Surveillance

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[Positives Map](#)
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Rabies, Animal and Rabies post-exposure prophylaxis (PEP), initiated

Rabies is a fatal viral illness that affects both animals and humans. Laboratory testing for rabies is useful for confirmation of the virus' presence in certain species, and for determination of the need to administer rabies prophylaxis in cases of human exposure to a potentially rabid animal. Surveillance for this disease in the domestic and wild animal population is a valuable tool in the prevention of human rabies cases.

During 2006, 66 cases of animal rabies were detected in Missouri, compared to 73 cases the previous year, representing a 10% decrease (Table 1). Animals found to be rabid in Missouri during 2006 included: bats (55 cases); skunks (8 cases); cattle (1 case); and horses (2 cases). The number of specimens tested in 2006 was 2,658, with 66 found positive, giving a positivity rate of 2.48%. In 2005, 73 of 2,594 submitted specimens tested positive, yielding a 2.81% positivity rate. The annual number of rabies cases during the preceding ten years (1996-2005) ranged from a low of 26 cases in 1996 to a high of 73 cases in 2005.

The median number of cases per year during this time period was 42.5.

Wild and domestic animals are tested for rabies only when they have potentially exposed a person or pet, or in other situations with possible public health implications. In 2006, specimens were submitted in a representative fashion from all regions of the state. Rabies in bats occurs sporadically across Missouri, while rabies in skunks is usually confined to about the southern one-third of the state. During 2006, two rabid skunks were detected as far north as the St. Louis region. Both the north-central and south-central variants of the skunk rabies virus are found in rabid skunks in Missouri.

A county is placed under a "rabies alert" when a positive domestic animal is detected in that county, or when the threshold level for rabid wild animals is exceeded. Five counties were placed under alerts in 2005. Barton County was placed under a three-month alert beginning February 8, 2006 due to a rabid calf. Cole County was placed under a five-month alert beginning July 25, 2006 due to an excessive number of rabid bats. Jackson County was placed under a four-month alert beginning August 30, 2006 due to an excessive number of rabid bats. One rabid horse was detected in each of Pulaski and Callaway Counties; both counties were placed under four-month alerts beginning on September 14, 2006.

Table 1 - Animal Rabies, by Species, Missouri 2006			
Species	Number Examined	Number Positive	Percent Positive
Bat	1,180	55	4.7%
Cat	520	0	0.0%
Cow	26	1	3.8%
Dog	617	0	0.0%
Fox	12	0	0.0%
Horse	22	2	9.1%
Other Domestic	6	0	0.0%
Other Wild	41	0	0.0%
Raccoon	98	0	0.0%
Rodent/Rabbit	110	0	0.0%
Skunk	26	8	30.8%
Total	2,658	66	2.5%



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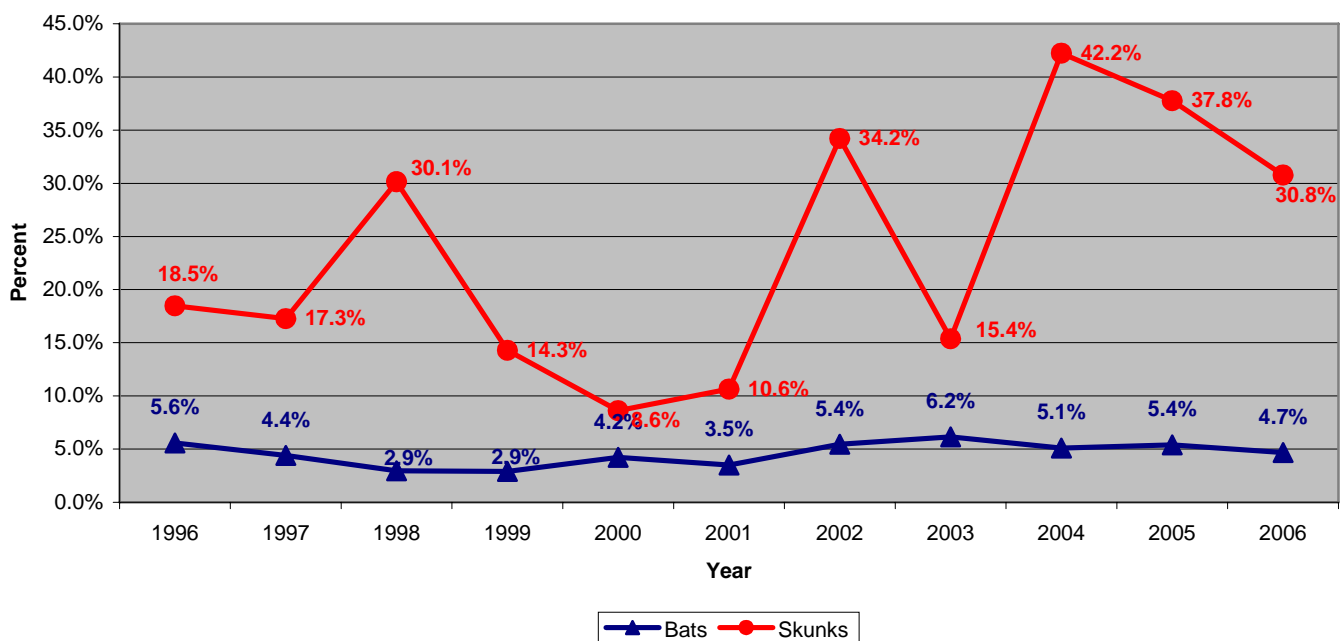
Rabies - Continued

The percent of bats that test positive for rabies does not fluctuate greatly from year to year, ranging from about 3 to 6 percent from 1996 – 2006. This correlates closely with the experience of other states, even during periods when bat rabies is “epizootic.” The percent positive can presumably reach somewhat higher levels in a smaller geographic region (e.g., in a given city or county), but it would be unusual to vary substantially from statewide levels in the long term. Bats remain the major source of exposure for humans since their bites can seem insignificant or go unnoticed, and because they often find their way into living quarters due to their small size.

The percent of skunks that test positive for rabies fluctuates significantly as environmental and skunk population factors vary, making transmission of this virus more easily accomplished. This is also consistent with national trend data. In Missouri, percent positive rates varied from about 9 to 42 percent during the period 1996 – 2006. Public health authorities should notify citizens when rates begin to climb above “normal” levels, since rabies in a terrestrial species like the skunk is more likely (than bat rabies) to be transmitted to other terrestrial species such as livestock, dogs, and cats.

Other wild and domestic species of animals in Missouri are found to be rabid each year. Although they are of public health significance, their relatively low numbers do not make calculation of percent positive rates statistically meaningful over long periods of time.

Percent of Positive Rabies Tests, Bats and Skunks, 1996-2006



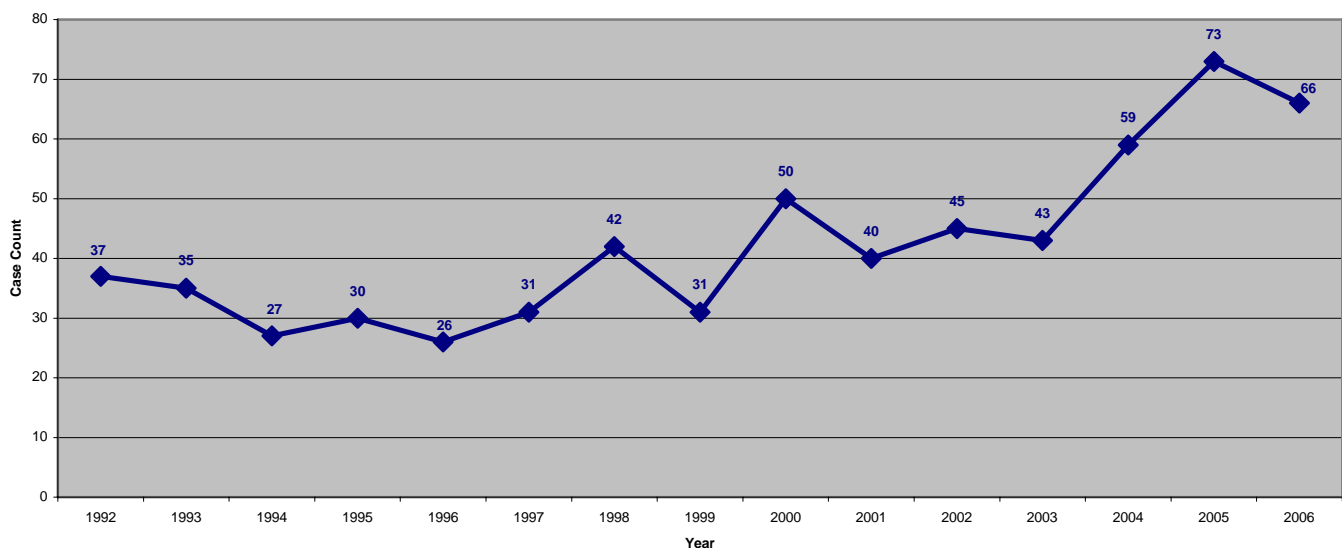


Section A - Communicable Disease Surveillance

Rabies - Continued

Rabies post-exposure prophylaxis (PEP), initiated, must be reported to the local health authority or the Department of Health and Senior Services within three calendar days of first knowledge or suspicion as of August 31, 2006 (refer to 19 CSR 20-20.020, Reporting Communicable, Environmental and Occupational Diseases; available on the web at <http://www.sos.mo.gov/adrules/csr/current/19csr/19c20-20.pdf>). This condition was made reportable for a number of reasons. First, a significant number of persons receive rabies post-exposure prophylaxis (PEP) in the United States (about 40,000 per year according to the Centers for Disease Control and Prevention). Any condition that affects this many persons should be quantified when possible. Second, at an average cost of \$2,500 per rabies PEP regimen, reporting the number of persons treated each year in Missouri will help determine the total cost for this healthcare intervention. Finally, quantification of rabies PEP will help public health officials assess whether it is being recommended by physicians in Missouri at a level that is consistent with national trends.

Reported Case of Animal Rabies, by Year, Missouri



Human rabies in Missouri is uncommon, with the last case reported in 1959. The low frequency of cases does not mean rabies is not a threat. To the contrary, this major public health victory is directly attributable to an effective medical preventive regimen (i.e., anti-rabies shots), improved public health practices (e.g., animal quarantine/testing, prompt investigation of animal bite incidents by local public health agencies), and improved rabies vaccinations for dogs and cats.

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Section A - Communicable Disease Surveillance

Shigellosis

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Shigellosis is an infectious disease caused by a group of bacteria called *Shigella*. Most who are infected with Shigellosis develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the organism. Stools are frequent, loose to watery, of small volume and often mucoid and/or bloody. The diarrhea is usually self-limiting, resolving in 5 to 7 days. Young children and the elderly may be more severely affected, in some cases needing hospitalization. However, some persons who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others.

Humans are the primary source of this infectious disease, however, other animals can carry or pass *Shigella*. Shigellosis is transmitted by the fecal – oral

route. When those who are infected fail to adequately wash their hands following a bowel movement, they subsequently transfer the organisms to food or objects that are ingested or placed in someone else's mouth. The infectious dose is quite small, from 10 to 200 organisms, compared to 10⁷ organisms for *Salmonella*. For this reason, it is extremely easy to spread shigellosis from person to person.

Statewide in 2006, Missouri recorded 658 [confirmed](#) and [probable](#) cases of shigellosis. This represents a statewide incidence rate of 11.3 per 100,000 population, more than twice the median incidence rate for the previous five years of 5.5 per 100,000.

Table 1. Shigellosis—Comparative Statistics, by Socio-demograph Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	366	55.6%	12.3	176	108.0%
	Male	292	44.4%	10.3	145	101.4%
Race	Black	82	12.5%	11.9	41	100.0%
	Other	2	0.3%	1.7	0	N/A
	Unknown	182	27.7%	N/A	154	18.2%
	White	392	59.6%	7.9	105	273.3%
Age Group	00 to <01	16	2.4%	20.4	9	77.8%
	01 to 04	219	33.3%	73.7	100	119.0%
	05 to 14	248	37.7%	32.9	82	202.4%
	15 to 24	36	5.5%	4.3	21	71.4%
	25 to 39	76	11.6%	6.6	46	65.2%
	40 to 64	52	7.9%	2.7	27	92.6%
	65 plus	9	1.4%	1.2	4	125.0%
	Unknown	2	0.3%	N/A	6	-66.7%
Region	Central	33	5.0%	5.2	13	153.8%
	Eastern	123	18.7%	5.6	154	-20.1%
	Northwest	75	11.4%	5	40	87.5%
	Southeast	361	54.9%	77.7	5	7120.0%
	Southwest	66	10.0%	6.8	41	61.0%
State of Missouri		658	100.0%	11.3	321	105.0%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



Section A - Communicable Disease Surveillance

Shigellosis - Continued

In 2005 the Kansas City metropolitan area was hard hit by an outbreak of shigellosis accounting for the bulk of cases during that year. In 2006 there was a dramatic shift in the number of cases throughout the more rural areas of the state. The Southeast Region was hardest hit, with over half (54.9%) of the cases occurring in this region alone. Of the 658 total cases reported in Missouri, 361 occurred in the more rural Southeast Region. Pulsed field electrophoresis (PFGE) analysis of the cases in the Southeast Region showed a slightly different pattern than seen in the Northwest Region outbreak during 2005. Further, antibiotic resistance was minimal with the Southeast Region strain, allowing for treatment with the most commonly used antibiotics.

While the strains were somewhat different between the outbreaks, the similarities lay in the population that were infected. As seen in the Northwest Region outbreak, children were predominately affected during the Southeast Region outbreak as well. Preschool aged children (0 – 4 years) represented 35.7% of the cases, elementary aged (5 – 14 years) represented 37.7% of the cases and those above 15 years represented the remaining 26.3%.

Many of the cases were likewise associated with childcare or had a sibling that attended an affected childcare center. In total there were 12 licensed childcare centers that had confirmed cases of shigellosis in the Southeast Region. The counties affected worked very closely with these centers to implement effective control measures. At the initiation of the outbreak, supervised hand washing was swiftly implemented and centers were educated on proper diapering procedures. Because of the knowledge gained during the Northwest Region outbreak these interventions were promptly enacted and decreased transmission rates significantly. The outbreak in the Southeast Region swiftly declined once mechanisms for control were in place.

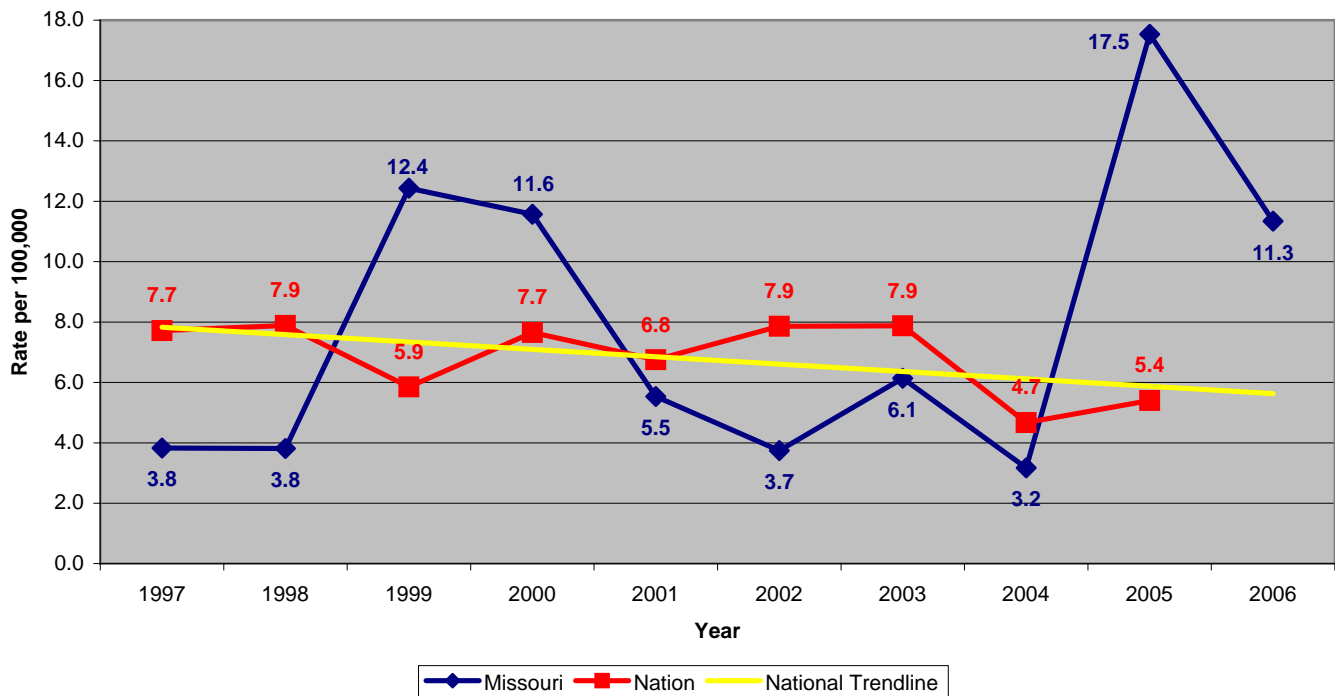
Comparison to national trend: Missouri has been above the national rate for the past two years of 2006 and 2005. This is due in large part to an outbreak that occurred in each of these years. Historically, Missouri occasionally climbs above the national rate for a few years, then drops back down to at or below the national rate.



Section A - Communicable Disease Surveillance

Shigellosis - Continued

Rate of Reported Cases, Confirmed and Probable, Shigellosis, by Year
Missouri versus United States



National and state trends have demonstrated an affinity of shigellosis in the younger populations, as revealed from the outbreaks of shigellosis in Missouri that occurred in 2005 and 2006. Through diligent work with childcare centers and making certain that these facilities are meeting state standards/requirements, and providing expert consultation and educational materials, the numbers of shigellosis cases were far less than would have been expected in absence of these standards/requirements. These outbreaks demonstrate the need for the Bureau of Environmental Regulation and Licensure to maintain and oversee these standards/requirements at the state and local levels and our need to educate all populations on the benefits of good person hygiene.

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Section A - Communicable Disease Surveillance

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[TB Map](#)
[LTBI Map](#)

Tuberculosis

Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria can attack any part of the body, but it usually attacks the lungs. TB is spread through the air from one person to another. The bacteria are expelled into the air when a person with TB disease of the lungs or throat coughs or sneezes.

People who become infected with TB bacteria usually have had very close, day-to-day, contact with someone who has TB disease (e.g. a family member, friend, or close co-worker). You are not likely to get infected from someone coughing in line at a supermarket or restaurant.

Dishes do not spread TB, nor do drinking glasses, sheets or clothing. In most people who become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI).

Statewide in 2006, Missouri recorded 104 cases of TB disease. This represents a statewide incidence rate of 1.8 per 100,000. This reflects a steady decline in cases over the last five years from 157 cases in 2001 with an incidence rate of 2.8 per 100,000. The national trend for TB also shows a steady decline from 5.4 cases per 100,000 in 2001 to 4.6 cases per 100,000 in 2006.

The Eastern Region reported the highest number of cases (see Table) with 40.4% of the state's total cases while the Southeast Region had the fewest number of cases with 6.7% of the total cases. The 40-64 year age group reported the largest number of TB cases in 2006 with 32.7% and is comparable to 2005 when 37% was reported in that age group.

Table 1. Tuberculosis — Comparative Statistics, by Socio-demograph Category, Missouri¹

		Case Count 2006	% of Total	Rate * 2006	5-Year Median	% Change from 5- Year Median
Sex	Female	47	45.20%	1.6	42	11.90%
	Male	57	54.80%	2	89	-36.00%
Race	Black	29	27.90%	4.2	49	-40.80%
	Other	20	19.20%	16.9	16	25.00%
	White	55	52.90%	1.1	63	-12.70%
Age Group	00 to <01	3	2.90%	3.8	1	200.00%
	01 to 04	7	6.70%	2.4	2	250.00%
	05 to 14	2	1.90%	0.3	4	-50.00%
	15 to 24	7	6.70%	0.8	12	-41.70%
	25 to 39	30	28.80%	2.6	24	25.00%
	40 to 64	34	32.70%	1.8	44	-22.70%
	65 plus	21	20.20%	2.7	42	-50.00%
Regions	Central	8	7.70%	1.3	7	14.30%
	Eastern	42	40.40%	1.9	50	-16.00%
	Northwest	32	30.80%	2.1	39	-17.90%
	Southeast	7	6.70%	1.5	9	-22.20%
	Southwest	15	14.40%	1.5	19	-21.10%
State of Missouri		104	100.00%	1.8	131	-20.60%

¹ Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.

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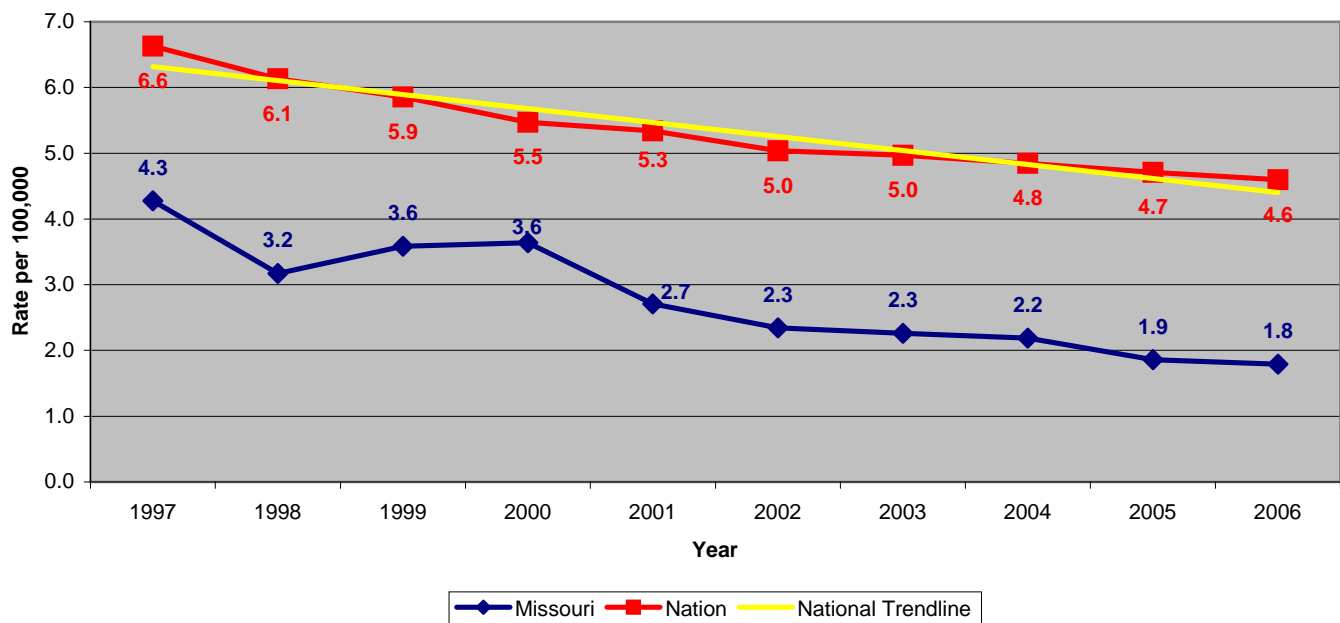
Tuberculosis - Continued

Latent TB Infection

Suspected and/or confirmed TB disease is a reportable condition by law in Missouri. Missouri is one of several states that also require reporting of latent TB infection or LTBI. If an individual has a normal chest x-ray and a positive TST (tuberculin skin test) they are considered infected with TB and could benefit from treatment. Persons at greatest risk for exposure to TB would be: close contacts of a person with known/suspected TB, foreign-born persons from areas where TB is common, residents or employees of high-risk congregate settings such as jails, prisons, homeless shelters, nursing homes, and health care workers. Persons at higher risk for developing disease once infected include: HIV-positive persons, medically underserved and persons with certain medical conditions.

Missouri had 3,837 reported cases of latent TB infection in 2006. Approximately, 10% of these individuals could develop TB in their lifetime if not treated for latent TB infection.

Rate of Reported Cases, Confirmed and Probable, Tuberculosis, by Year
Missouri versus United States



Although cases of TB in Missouri have been declining there are several areas of concern and are being monitored by the Department. These areas are:

- The prevalence of TB among foreign-born individuals residing in Missouri. In 2006 48% of all TB cases were individuals who were born outside of the United States. This is an increase of 13% from 2005.



Section A - Communicable Disease Surveillance

Tuberculosis - Continued

- Isoniazid (INH) Resistance in Missouri is increasing. In 2006 the number of TB cases, which were resistant to the first line medication of INH, doubled from five cases (6.7% of all cases) in 2005 to 11 cases (10.9% of all cases) in 2006.
- During 2006, Missouri has had eight (8) college/university international students diagnosed with active TB. The students came from various countries around the world: Nigeria, Ethiopia, China, South Korea, Japan and India. Three colleges/universities have had extended TB contact investigations to identify students/faculty who may have been infected. Almost 500 students and faculty were identified as contacts to seven of these cases. As a result of these contact investigations, 57 individuals were diagnosed with latent TB infection.
- A contact investigation that was of significant concern in 2006 was a group home in eastern Missouri with three cases of TB (including one death). Forty-eight residences of this group home were identified as possible contacts to these cases. Forty-one of those sought for evaluation were evaluated for tuberculosis and eight were determined to have latent tuberculosis infection.

A virtually untreatable TB is now emerging on a global scale. Extensively drug-resistant tuberculosis (XDR-TB) is a relatively rare type of multidrug-resistant tuberculosis (MDR-TB). It is resistant to almost all drugs used to treat TB, including the two best first-line drugs: isoniazid and rifampin. XDR-TB is also resistant to the best second-line medications: fluoroquinolones and at least one of three injectable drugs (i. e., amikacin, kanamycin, or capreomycin). XDR-TB has been detected in all regions of the world, including the United States. The cost for treating XDR-TB is approximately twice the cost of treating MDR-TB.

Because XDR-TB is resistant to the most powerful first-line and second-line drugs, patients are left with treatment options that are much less effective and often have worse treatment outcomes with death occurring more frequently. XDR-TB is of special concern for persons with HIV infection or other conditions that can weaken the immune system. These persons are more likely to develop TB disease once they are infected, and also have a higher risk of death once they develop TB disease.

To date Missouri has not had a reported case of XDR-TB. The Bureau of Communicable Disease Control and Prevention has initiated a work group to review Missouri's readiness to respond to this emerging strain of tuberculosis.

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Section A - Communicable Disease Surveillance

Varicella (Chickenpox)

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Varicella is an acute febrile rash illness caused by *varicella zoster virus* (VZV). It is highly contagious, with secondary attack rates among susceptible household contacts of persons with varicella ranging from 65% to 90%. Transmission occurs from person to person most commonly from infected respiratory tract secretions and also by respiratory contact with airborne droplets or by direct contact or inhalation of aerosols from vesicular fluids of skin lesions of patients with acute varicella or herpes zoster lesions.

The incubation period for varicella is 10 – 21 days, most commonly 14 – 16 days. In healthy individuals, it is usually a mild self-limiting illness that lasts 4-5 days and is characterized by fever, malaise, and a generalized pruritic, maculopapular vesicular rash that evolves into noninfectious dried crust over a 5 – 6 day period. Period of communicability ranges from 1 to 2 days before onset of rash through the first 4 to 5 days, or until lesions have crusted.

Severity of the disease and complications are higher in neonates, children less than one year of age, adults and in immunocompromised individuals.

Severe complications include secondary bacterial infections (including cellulitis, necrotizing fasciitis, septicemia and Toxic Shock Syndrome), pneumonia, encephalitis, Reye Syndrome and occasionally death. Although immunity following varicella infection is considered to be long lasting, rarely reinfections may occur among immunologically normal or vaccinated individuals.

Before the availability of the vaccine in 1995, varicella was responsible for an estimated 4 million cases, 11,000 hospital admissions, and 100 deaths each year in the United States. The incidence closely approximated the birth cohort over time. It affected mainly children, with approximately 90% of cases occurring before age fifteen years. Since vaccination started in 1995, the highest rate of disease is reported in preschool age children.

Table 1. Varicella, Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006
Sex	Female	676	47.2%	22.8
	Male	753	52.6%	26.6
	Unknown	2	0.1%	N/A
Race	Black	45	3.1%	6.5
	Other	12	0.8%	10.1
	Unknown	120	8.4%	N/A
	White	1,254	87.6%	25.1
Age Group	00 to <01	34	2.4%	43.3
	01 to 04	119	8.3%	40
	05 to 14	1,183	82.7%	156.9
	15 to 24	57	4.0%	6.8
	25 to 39	25	1.7%	2.2
	40 to 64	6	0.4%	0.3
	65 plus	5	0.3%	0.6
	Unknown	2	0.1%	N/A
Region	Central	277	19.4%	43.5
	Eastern	212	14.8%	9.6
	Northwest	339	23.7%	22.4
	Southeast	115	8.0%	24.7
	Southwest	488	34.1%	49.9
State of Missouri		1,431	100.0%	24.7

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



Section A - Communicable Disease Surveillance

Varicella - Continued

Varicella deaths became reportable in Missouri in 1999 and subsequently; varicella cases were made reportable in 2005 . Reporting of diseases may not be complete in the state for various reasons, including uncomplicated cases not being seen or tested by providers very often and so not getting reported, and also not being reported by schools.

Not many uncomplicated varicella cases get tested in the laboratory. Individual cases and small to large outbreaks are often reported from schools and day care centers throughout the state, most of which are in vaccinated cases. This is no different than what is seen in other parts of the country.

Statewide, 1,431 cases of varicella were reported in 2006. This represents an incidence rate of 24.9 cases per 100,000 population. Cases were reported from all over the state, but the highest incidence was in the Southwest Region (488 cases, accounting for 34% of all cases reported statewide); followed by the Northwest Region (339 cases, 24% of all cases) and the Central Region (277 cases, 19% of all cases). In terms of incidence rate per 100,000 population, the Southwest Region topped with 51.7 cases per 100,000 population (a little over double the state's rate) followed by the Central Region (43.4 / 100,000). Interestingly, with 212 cases (15% of all cases), the Eastern Region (which includes the St. Louis metropolitan area) had the lowest incidence rate of only 9.6 per 100,000 in the state.

Fifty-three percent of all cases (753) were males, 47% females. There was not much difference in the gender distribution of the cases. With 1,254 cases reported among Whites, it accounted for 87.6% of all cases reported statewide, closely reflecting the states' population of 85% White.

The age group with the highest number, percentage and rate of cases reported in Missouri in 2006 is the 5 to 14 years group. With 1,183 cases reported in this age group, it represented nearly 83% of all cases reported in the state. The morbidity rate was 154.0 per 100,000 for this age group, followed by 43.8 per 100,000 in age group 00 to <01 year, and 40.5 per 100,000 in age group 01 to 04 years. Late adolescents (age >15 years) and adults together accounted for only 6.5% of all cases (93) reported in the state.

In the pre-vaccine era, according to the National Health Interview Survey (1990 – 1994) data, approximately 85% of cases nationwide occurred among children younger than 15 years of age. The highest age-specific incidence of varicella was among children 1 – 4 years of age, who accounted for 39% of all cases, followed by children 5 – 9 years accounting for 38% of cases. Adults 20 years of age and older accounted for 7% of cases.



Section A - Communicable Disease Surveillance

Varicella - Continued

Varicella vaccine was licensed in 1995, and by 2005, vaccination coverage among children 19 – 35 months of age was estimated to be 88%. By 2004, the number of varicella cases in a few surveillance areas declined by 83%-93% in all age groups (including infants and adults), but the decline was greatest among children aged 1 – 4 and 5 – 9 years, indicating reduced transmission of the virus in these groups.

Missouri data for 2006 shows that infants less than one year of age accounted for only 2.4% (34) of all cases and children 1 – 4 years of age accounted for 8.3% (119) of all cases. The impact of vaccination in Missouri among children could be better understood if the number, percentage and morbidity rate per 100,000 population for children age 5 – 14 years (the highest category accounting for nearly 83% of all cases in the state) could be broken down and analyzed in two age groups, 5 – 9 years and 10 – 14 years. The age group 5 – 9 years (representing vaccinated children) should show a significant decline compared with age group 10 – 14 years (representing mostly unvaccinated children, who missed vaccination for not having the vaccine available until 1995).

With only 6.5% cases reported in older adolescents and adults (15 years and older), it is quite apparent that vaccination impacted transmission of the virus in almost all age groups, thereby providing indirect benefit to adults, who are among the highest susceptible to development of complications, once infected.

Comparison to National Data: This chart was omitted because accurate comparisons could not be made due to recent Missouri reporting rule changes.

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Section A - Communicable Disease Surveillance

West Nile Virus Disease

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The West Nile virus is found in wild birds. The disease caused by the virus was first described in Africa in 1937, with outbreaks occurring later in Asia, Europe, and the Middle East. The virus was first documented in North America in 1999. West Nile became reportable in Missouri in 2002.

Most people infected with West Nile virus do not experience any symptoms. In about 20% of infected people, symptoms include fever, headache, tiredness, and body aches. In rare instances the virus can infect the human nervous system, causing diseases such as meningitis or encephalitis.

West Nile virus is maintained in nature through a complex life cycle involving wild birds and mosquitoes. When a mosquito feeds on an infected bird, it can pick up the virus and transmit it to other, uninfected birds. Occasionally, infected mosquitoes will feed on mammals such as horses, dogs, cats, and humans, and transmit the virus to them. Mammals are dead-end hosts and do not contribute to the transmission cycle.

Statewide in 2006, there were 63 reported confirmed and probable cases of West Nile virus, for a rate of 1.1 per 100,000 population. This is almost twice the median case count of 36 for the previous five-year period. People over 40 years of age accounted for 56 cases (88.9%). This is likely due to severe infections occurring more frequently in older people, who consequently seek medical care. Verified cases of West Nile virus disease subsequently are reported to public health authorities.

Table 1. West Nile Fever and Viral Encephalitis-Meningitis, Comparative Statistics, by Socio-demographic Category, Missouri¹

		Case Count 2006	% of Total	Rate* 2006	5-Year Median	% Change from 5- year Median
Sex	Female	27	42.9%	0.9	13	107.7%
	Male	36	57.1%	1.3	23	56.5%
Race	Black	6	9.5%	0.9	6	0.0%
	Other	1	1.6%	0.8	0	N/A
	Unknown	14	22.2%	N/A	9	55.6%
	White	42	66.7%	0.8	21	100.0%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	0	0.0%	0	0	N/A
	05 to 14	2	3.2%	0.3	1	100.0%
	15 to 24	3	4.8%	0.4	3	0.0%
	25 to 39	2	3.2%	0.2	6	-66.7%
	40 to 64	23	36.5%	1.2	18	27.8%
	65 plus	33	52.4%	4.3	13	153.8%
Region	Central	5	7.9%	0.8	7	-28.6%
	Eastern	31	49.2%	1.4	16	93.8%
	Northwest	14	22.2%	0.9	12	16.7%
	Southeast	4	6.3%	0.9	1	300.0%
	Southwest	9	14.3%	0.9	2	350.0%
State of Missouri		63	100.0%	1.1	36	75.0%

¹Socio-demographics are missing for some cases.

*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Data Source: Missouri Health Surveillance Information System.



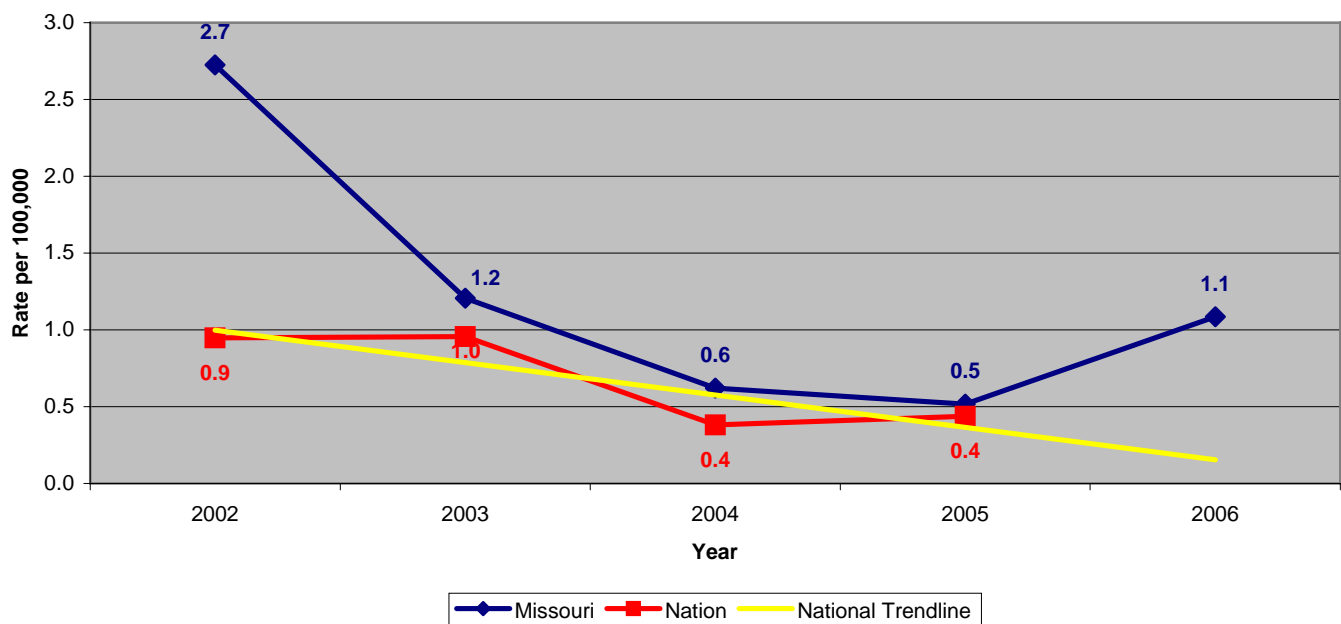
Section A - Communicable Disease Surveillance

West Nile Virus/Fever - Continued

Missouri's rate of West Nile virus has been declining since 2002, when the disease swept the Midwest, except in 2006 when there was a slight resurgence. The sudden drop in cases after 2002 may have been due to herd immunity which may now be waning. The increase in 2006 has alerted DHSS to the need for more public intervention programs.

West Nile virus surveillance assists with identifying geographic areas in need of targeted interventions. Public awareness of this disease and ways to prevent it (<http://www.dhss.mo.gov/WestNileVirus/Faq.html>) are of utmost importance in keeping the incidence of this disease low.

Rate of Reported Cases, Confirmed and Probable, West Nile Fever & Viral Encephalitis, by Year
Missouri versus United States



Additional Website Resources

[CDC Health Topics](#)
[CDIRM](#)
[Health Region Defined](#)



Glossary

Agent (of Disease) - A factor (e.g. virus, bacterium, parasite, chemical, or radiation) whose presence, excessive presence, or absence of, is essential for the occurrence of disease.

Bioterrorism - The intentional use of chemical, biological, or radiological agents as weapons during acts of violence or intimidation.

Case - A person or animal identified as having a particular disease.

Confirmed Case - surveillance definition, a case usually with positive laboratory results for the disease, generally associated with signs and symptoms of the disease.

Probable Case - surveillance definition, a case usually with a clinically compatible illness that is epidemiologically linked to a confirmed case.

Case Control Study - An epidemiologic study of persons with the disease of interest and a suitable control group of persons without the disease.

CD - Communicable Disease (or Infectious Disease) - diseases caused by biological agents such as a virus, bacterium or parasite.

Communicable - Able to spread disease from one person or species to another, either directly or indirectly; contagious.

Dead-End Host - a host from which infectious agents are not transmitted to other susceptible hosts.

Disseminated intravascular coagulopathy - bleeding into the skin.

ELC - Epi Laboratory Capacity Grant.

Epidemiology - The study of how and why diseases and other conditions are distributed within the population the way they are.

Epidemiologist - An investigator who studies the occurrence of disease or other health-related conditions or events in defined populations.

Epizootic - An outbreak of disease in an animal population that may also affect people.

Fecal-oral route - The transmission of an infectious agent by ingestion of feces.

Five-year Median - A data set which includes five consecutive year data totals where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the “middle” of the data.

Herd Immunity - The immunity of a group or community.



Glossary

Incidence - The number of new cases of a disease occurring in a population during a defined time period.

Incidence Rate - The rate at which new events occur in a population. For examples of the calculations, see [page 47](#).

Incubation period - The time between exposure to an infectious agent and appearance of the first sign or symptom of the disease.

Leukopenia - Abnormal decrease of white blood cells usually below 5000/mm³.

Malaise - A subjective sense of discomfort, weakness, fatigue, or feeling rundown that may occur alone or accompany other symptoms and illnesses.

MDR-TB - Multi-drug resistant tuberculosis

Mean - Commonly called average, is defined as the sum of the observations divided by the number of observations. For examples of the calculations, see [page 47](#).

Median - The point in a data set where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the “middle” of the data. For examples of the calculations, see [page 47](#).

Morbidity - Having disease, or the proportion of persons in a community with the disease.

Mortality - Refers to death.

Myalgia - Tenderness or pain in the muscles; muscular rheumatism.

Neonate - a newborn infant up to one month of age.

Nosocomial Infection - An infection occurring within an institution.

Outbreak - The occurrence of illness(es) similar in nature and clearly in excess of normal expectancy.

Pandemic - An outbreak occurring over a wide geographic area; widespread.

Pathogen - An organism capable of causing disease.

Pathogenic - Capable of causing disease.

PCR - Polymerase Chain Reaction. A laboratory procedure used to identify pathogens through amplification of genetic material.

PFGE - Pulse Field Gel Electrophoresis. A laboratory procedure of bacterial strain typing.

Prevalence - The total number of cases of a disease existing in a given area at any given time.



Glossary

Preventable TB case:

- A person with a previous positive TB skin test who is a candidate for treatment and not offered treatment;
- A person with a risk factor for TB who is never offered a TB skin test; and/or
- A secondary case to a preventable case.

Quartile - Any of three values which divide the sorted data set into four equal parts, so that each part represents 1/4 of the sample or population.

Risk Factors - The presence of any particular factor known to be associated with health related conditions considered important to prevent.

SDCEE - Section for Disease Control and Environmental Epidemiology

Serotype - To distinguish organisms on the basis of their constituent antigen(s).

Surveillance (of disease) - An ongoing mechanism to collect, analyze, interpret and distribute information.

Trend - Shows movement consistently in the same direction over a long time.

Thrombocytopenia - An abnormal decrease in the number of platelets.

Vaccine - A suspension of attenuated live or killed microorganisms or fractions thereof, administered to induce immunity and thereby prevent infectious disease.

XDR-TB - Extensively drug-resistant tuberculosis

Zoonosis - A disease communicable from animals to humans.



Statistical Calculations

Examples of Central Tendency Calculation

Mean

Calculate the **mean** by adding all of the values and dividing the sum by the number of observed values (in this case 11).

$$55 + 12 + 60 + 46 + 85 + 27 + 39 + 94 + 73 + 5 + 60 = 556$$

$$556 / 11 = 50.54545455$$

The **mean** for this data set is **50.5** (result is rounded).

Median

The **median** is the element that falls in the middle of the ordered set. Rank the values from least to most:

5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94.

In this example the **median** is the sixth element in the set, which is **55**.

5, 12, 27, 39, 46, **55**, 60, 60, 73, 85, 94

Example of a Measure of Frequency Calculation

Incidence rates are calculated with the following equation:

(**X** divided by **Y**) multiplied by **K**

Where:

X is the number of cases for a specified time period

Y is the population (possibly exposed) for the same time period

K is a constant (often 1000 or 100,000) that transforms the result into a uniform quantity allowing comparison with other similar quantities.

Example: The Southwest Region has 86 cases of Hepatitis A in 1993, compared to 63 cases in the Central Region for that year. The 1993 population for the Southwest Region is 694,712, while the population for the Central Region is 621,740.

$$\text{Southwest Region: } (86 / 694,712) * 100,000 = 12.4$$

$$\text{Central Region: } (63 / 621,740) * 100,000 = 10.1$$

A comparison of the two incidence rates shows that in 1993 Southwest Region has a slightly higher incidence of Hepatitis A (12.4 reported cases per 100,000 population) than the Central Region (10.1 reported cases per 100,000 population).